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CONTENTS

	PAGE
SALMON, J. T., D.Sc., F.R.S.N.Z., F.R.E.S. The Collembola of the United States Antarctic Service Expedition, 1939–1941. Supplementary note.	161–162, 2 figs.
THOMAS, H. T. New species of Oriental *Sarcophaga* Meigen (Diptera: CALLIPHORIDAE) with a note on the systematic importance of the postsutural dorso-central bristles in that genus	163–174, 7 figs.
CAMERON, MALCOLM, M.B., R.N., F.R.E.S. New species of STAPHYLINIDAE (Col.) from Formosa	175–176
DIRSH, V. M., D.Sc. Two new species of *Pezotettix* Burmeister, 1840 (Orthoptera: ACRIDIDAE)	177–179, 16 figs.
MARSHALL, Sir GUY A. K., D.Sc., F.R.S. On the genus *Leptostethus* Waterhouse (Col., Curcul.)	180–183, 1 fig.
CORBET, the late A. STEVEN, D.Sc., Ph.D., F.R.I.C. The Linnaean names of Indo-Australian Rhopalocera. Part 6. The case of *Papilio plexippus* Linnaeus, 1758	184–190
CORBET, the late A. STEVEN, D.Sc., Ph.D., F.R.I.C. The Linnaean names of Indo-Australian Rhopalocera. Part 7. Summary of determinations	191–199
BOOK NOTICES	174, 199, 200

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THE COLLEMBOLA OF THE UNITED STATES ANTARCTIC SERVICE EXPEDITION, 1939–1941. SUPPLEMENTARY NOTE.

By J. T. Salmon, D.Sc., F.R.S.N.Z., F.R.E.S.

(*Victoria University College, Wellington, New Zealand.*)

In the *Proceedings of the American Philosophical Society*, **89** (1) : 295 (April, 1945) there appeared a short article by Grace Glance giving details, without specific identifications, of two forms of Collembola collected in the vicinity of East Base by H. M. Bryant. In response to my suggestion Miss Glance kindly arranged for this material to be forwarded to me for examination and identification, and I should like to express my appreciation of the opportunity thus afforded me to study this interesting antarctic material. The species placed by Miss Glance in the Poduridae proves to be *Friesea grisea* (Schaeffer) of the Pseudachorutini, and the species similarly placed in the Isotomidae proves to be *Cryptopygus antarcticus* Willem of the Anurophorini, the genotype species of the genus *Cryptopygus* Willem. Both species appear to be fairly widely distributed throughout the Antarctic and the following brief notes, which contain matter additional to that given in their original descriptions, should be helpful to investigators of this interesting group of insects.

Friesea grisea (Schaeffer, 1891).

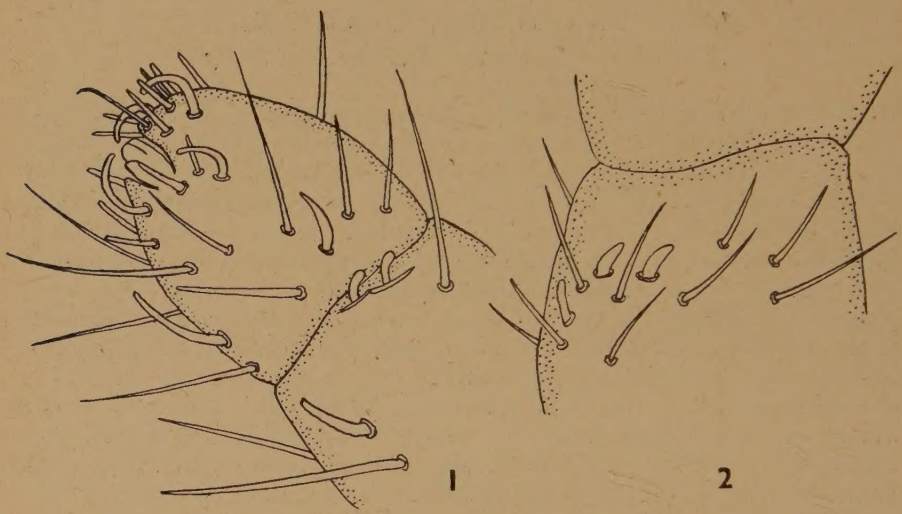
1891, *Tullbergia grisea* Schaeffer.
1897, *Pseudotullbergia grisea* Schaeffer.
1902, *Achorutoides antarcticus* Willem.

Deep blue-black species up to 2 mm. in length ; antennae about half as long as head, segments III and IV more or less fused, the three segments related as 14 : 15 : 25 ; sense organs of Ant. III and IV as in fig. 1, antennae clothed with moderately long plain setae ; ocelli eight to each side, subequal ; anal spines present, two, thin and tapering, erect or curved slightly forwards, about three-quarters as long as the hind claw and each arising from a very small basal papilla ; body sparsely clothed with moderately long and short stiff setae ; furcula vestigial, reduced to a stump, tenaculum well developed, the rami each with two barbs ; claw without teeth but with two pairs of tenent hairs on the outer edge, the longer pair being further removed from the claw base than the shorter pair, similarly on the inner edge of the claw there is a pair of short tenent hairs arising close to the claw base and a longer pair somewhat removed ; unguiculus absent ; many of the setae on the tibiotarsus are lightly clavate or apically hooked ; there is a long basal seta to each side of claw.

Cryptopygus antarcticus Willem, 1902.

Deep blue-black species up to 1.8 mm. long; antennae approximately equal to the head in length, the four segments related as 4 : 7 : 8 : 10 ; Ant. IV with apical sensory dome and clothing of short, both straight and curved, setae ; sensory organ of Ant. III as in fig. 2 ; ocelli six to each side, subequal ; post-antennal organ elongate and very narrow, curved, 6–8 times longer than broad and three times longer than the diameter of the adjacent ocellus ; body well clothed with both short and long simple setae ; mucro elongate, with

small apical tooth and very large, erect, pre-apical tooth, the dens with one long basal ventral seta and three short ventral setae ; tenaculum well developed, the rami each with four barbs ; claw with a pair of exterior lateral teeth about two-fifths down, no inner teeth, a single tenent hair to the front feet, but two to each of the other feet, all longer than claw and lightly clavate ; a fairly long basal seta to each side of claw ; unguiculus from one-third to a half as long as claw with broad inner and outer lamellae, the inner strongly curved.



FIGS. 1–2.—(1) *Friesea grisea*, sensory organs of Ants. III and IV. (2) *Cryptopygus antarcticus*, sensory organ of Ant. III.

Willem, in his original description of this species, gives the number of ocelli to each side as seven ; in some specimens there is a structure which appears like a seventh small ocellus, but I think the normal number is six. This is also the opinion of Wahlgren (1908).

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NEW SPECIES OF ORIENTAL *SARCOPHAGA* MEIGEN (DIPTERA: CALLIPHORIDAE) WITH A NOTE ON THE SYSTEMATIC IMPORTANCE OF THE POSTSUTURAL DORSOCENTRAL BRISTLES IN THAT GENUS.

By H. T. Thomas.

(*Department of Zoology, University of Cambridge.*)

This paper deals with five new species of the genus *Sarcophaga* Meigen, from Szechwan, a province of central China.

As is usual in this genus, the descriptions given primarily concern the males, but in two species recorded here, the females are known. These are described and their terminalia figured, but an analysis of the diagnostic characters of the terminalia is deferred, pending further work on females of this genus. One of the species (*S. gigas* sp. n.) has been reared from first stage larvae to the adult in the laboratory.

The species recorded are :

1. *Sarcophaga graciliforceps* sp. n.
2. ,, *pterygota* sp. n.
3. ,, *gigas* sp. n. (female recorded).
4. ,, *diminuta* sp. n. (female recorded).
5. ,, *genuforceps* sp. n.

Although it is as yet almost impossible, except in a few special cases, to determine the mutual affinities of species of *Sarcophaga*, an attempt has been made to fit the new species into the key to the male species of Oriental *Sarcophaga* in Senior-White, Aubertin and Smart (1940), even though this key is not entirely satisfactory. It is possible that some of them are palaearctic species.

The head is viewed from in front when measuring the width of the "frons" ; and the width given in the descriptions is the narrowest region of the frons. The head is viewed antero-laterally when measuring the eye-width ; the measurement given is the greatest width of the eye. In the figures, the lateral view of the male terminalia is drawn from dried specimens set with the terminalia extended. The male terminalia of *S. gigas* sp. n. and the female terminalia, however, are drawn from macerated material. The chaetotaxy of the specimens was examined with a × 20 lens.

The author wishes to acknowledge his indebtedness to Dr. John Smart for valuable criticisms in the preparation of the manuscript.

Sarcophaga graciliforceps sp. n.

Length : 9 mm.

Male. Head.—Frons less than ½ (0·42) an eye-width. Lateral verticals undeveloped. Frontals 8, lower 3 widely diverging. Frontal stripe black, well defined, slightly narrower (0·94) than combined width of parafrontalia at frons. Parafrontalia and parafacialia dull brassy to light golden pollinose, with very sparse, minute hairs, latter with about 3 weak hairs. Antennae dark, 3rd segment little over 2 × length of 2nd ; arista moder-

ately long plumose. Palpi black. Occiput with black hairs, but no regular rows except the usual outer one. Buccal vestiture entirely black.

Thorax yellowish cinereous pollinose. Acrostichals 0 : 1 (prescutellars). Postsutural dorsocentrals 3, an indication of a small extra bristle anteriorly, but posterior 3 all prominent; presuturals 2–3, outstanding; the dorsocentrals are of the type of *S. melanura* Meigen. Intra-alars 0–1 : 2. Propleura bare. Metathoracic spiracle chocolate.

Wings.—Veins brown. Anterior cross-vein under distal ½ of section iii of costa. Section v of costa about equal to (1·2) section iii. Bend of IVth vein a right angle. Costal spine present. Vein I bare.

Fig. 1.—*Sarcophaga graciliforceps* sp. n.: male terminalia. *a*, posterior aspect of forceps; *b*, half of sternite V (drawn *in situ*). a.c., anterior clasper; p.c., posterior clasper; f., forceps.

Legs.—Middle femora: antero-ventrally, with irregular bristles and a comb; postero-ventrally, haired on basal ⅓, with bristles and a comb following. Hind femora: antero-ventrally, with about 4 bristles (excluding the usual sub-apical bristle); postero-ventrally, practically bare but for small bristles in middle portion. Hind tibiae with sparse fringes antero- and postero-ventrally.

Abdomen cinereous pollinose. Tergite III without median marginals. Sternites I–IV with short, sparse hairs. *Genital segments* dark brown to black; 1st segment pollinose, with no marginals; 2nd segment shining.

The male terminalia of *graciliforceps* are illustrated in fig. 1. The forceps, as seen in profile, is long, slender and slightly sinuate, and is clothed with short, sparse hairs on its basal ½. The claspers are short. The phallosome is comparatively simple.

Number of specimens examined: 4.

Female.—Unknown.

Bionomics.—Taken on mountain-side (1800 ft.).

Type-locality. China: Chungking (Koloshan); April, 1944 (*H. T. Thomas*). *Type* will be sent to the National Institute of Health, Nanking, China; *paratypes* are in the British Museum and in the author's collection.

This species runs to *S. josephi* Böttcher in the key of male *Sarcophaga* in Senior-White, Aubertin and Smart, 1940 (couplet 6). *S. josephi* differs from this species, however, in the structure of the terminalia, particularly of the phallosome and forceps; it also has a row of fine marginals on the first genital segment; the second genital segment is lightly dusted with pollen; and there are no bristles on the antero- and postero-ventral borders of the hind femora (except the usual sub-apical bristle on the antero-ventral border).

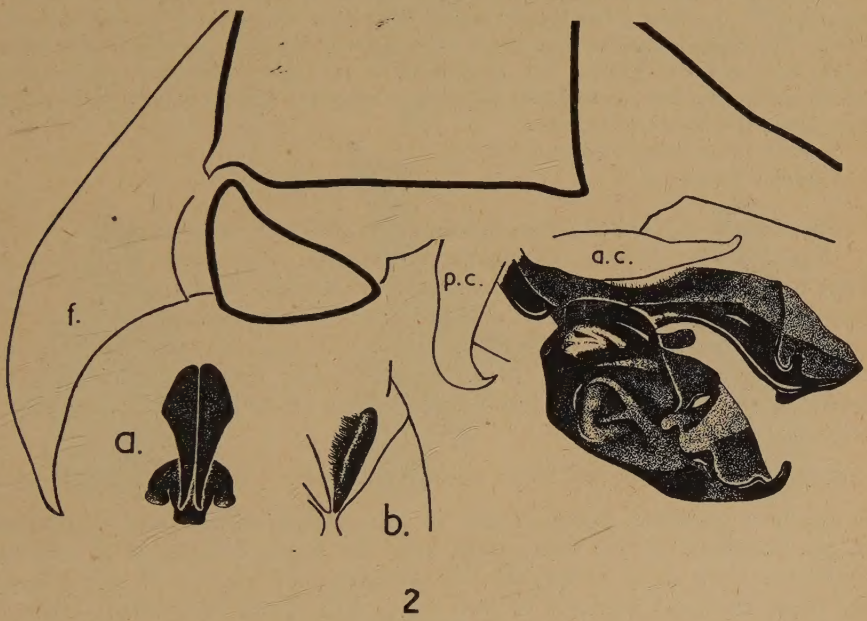

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Fig. 2.—*Sarcophaga pterygota* sp. n.: male terminalia. *a*, posterior view of forceps and phallosome; *b*, part of sternite V (drawn *in situ*). a.c., anterior clasper; p.c., posterior clasper; f., forceps.

Sarcophaga pterygota sp. n.

Length: 6·5–9·5 mm.

Male. Head.—Frons less than $\frac{1}{2}$ (0·43) an eye-width. Lateral verticals undeveloped. Frontals 7–9, lower 3 widely diverging. Frontal stripe black, well defined, narrower (0·74) than parafrontalia together at frons. Parafrontalia and parafacialia silvery pollinose, shifting to brassy tinge, hairs on former microscopic, 4–5 rather weak hairs on latter. Antennae dark, 3rd segment little over $1\frac{1}{2}$ × length of 2nd; arista short to moderately long plumose. Palpi black. Occiput with 2–3 rows of black hairs. Buccal vestiture entirely black.

Thorax yellowish to slate-grey pollinose. Acrostichals 0:1 (prescutellars). Post-sutural dorsocentrals 3; presuturals 2–3, outstanding; the dorsocentrals are of the type

of *S. melanura* Meigen. Intra-alars 0–1 : 2–3. Propleura bare. Metathoracic spiracle chocolate. Thoracic chaetotaxy well developed.

Wings.—Veins brown. Anterior cross-vein under middle of section iii of costa ; latter about equal to section v of costa. Bend of IVth vein a right angle. Costal spine developed, may be prominent. Vein I bristled.

Legs.—Middle femora : antero-ventrally, with a few bristles and a comb ; postero-ventrally, with sparse hairs on basal ¼ and bristles towards apex—often no true comb. Hind femora : antero-ventrally, with 4–5 bristles (excluding the usual sub-apical bristle) ; postero-ventrally, with sparse, bristle-like hairs. Hind tibiae with sparse fringes antero- and postero-ventrally.

Abdomen cinereous pollinose. Tergite III without median marginals. Sternites with long, fine hairs. *Genital segments* black or brown ; 1st and 2nd segments pollinose, former without marginals.

The male terminalia of *pterygota* are illustrated in fig. 2. The forceps, as seen in profile, is thick-set in the basal ½ but rapidly tapers to a point ; its basal ⅔ is clothed with short hairs. The anterior claspers show about 4 fine hairs on the basal portion of their inferior aspect (not shown in figure). The phallosome is not highly sclerotized. A prominent feature is the wing-like appendages which spread laterally ; the upper basal portion of the appendages bristles with fine hairs.

Number of specimens examined : 9.

Female.—Unknown.

Bionomics.—Collected on mountain-side (1800 ft.), on sandy soil.

Type-locality. China : Chungking (Koloshan) ; June, 1944 (*H. T. Thomas*). *Type* will be sent to the National Institute of Health, Nanking, China ; *paratypes* are in the British Museum and in the author's collection.

This species runs to couplet 3 in the key of male *Sarcophaga* in Senior-White, Aubertin and Smart, 1940. To insert this species in the key, it is necessary to make couplet 3 into a triplet, with an additional line running as follows :

Segment iii of costa equal to v ; vein I bristly . . . . *pterygota* sp. n.

S. calicifera Böttcher, which is also in this triplet, differs from *S. pterygota* in the structure of the terminalia, and the main differences in external characters seem to be as follows : in *calicifera*, the frontals do not diverge ; the third antennal segment is two and a half times the second segment ; section iii of the costal vein is much shorter than section v ; and tergite III bears median marginals.

Sarcophaga gigas sp. n.

Length : 10–19 mm.

Male. Head.—Frons equals ½ (0·52) an eye-width. Lateral verticals generally not developed, but may be small. Frontals 11–12 (maximum variation, 9–13), lower 3–5 diverging. Frontal stripe black, well defined, equals combined width of parafrontalia at frons. Parafrontalia and parafacialia golden pollinose, with small, fine hairs. Antennae dark, 3rd segment 1·7 × length of 2nd ; arista long plumose. Palpi black. Occiput with 3 rows of black hairs ; internal rows may not be very regular in males. Buccal vestiture entirely black.

Thorax slate-grey pollinose. Acrostichals 0 : 1 (prescutellars). Postsutural dorsocentrals 5, 1st 2 small ; presuturals about 4, inconspicuous ; the dorsocentrals are of the type of *S. albiceps* Meigen. Intra-alars 1 : 3, 1st post-sutural may be reduced or absent. Propleura bare. Metathoracic spiracle chocolate.

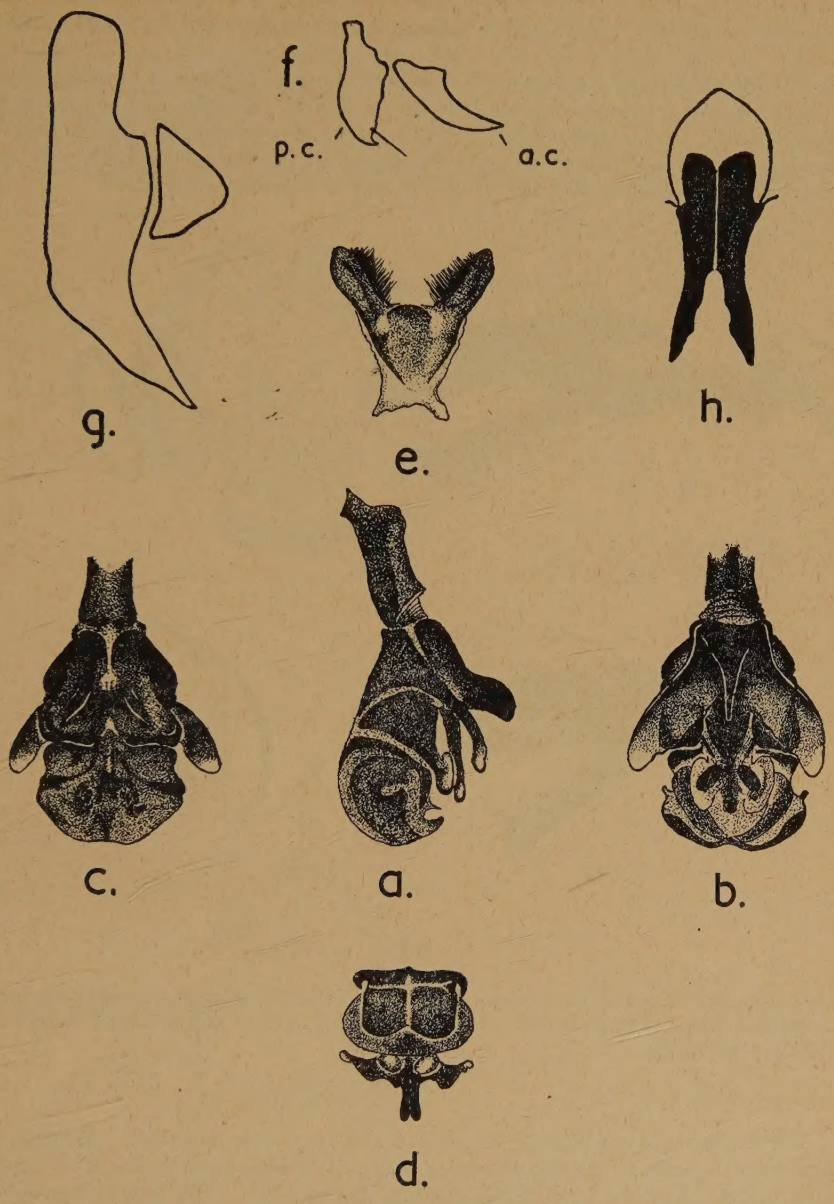

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FIG. 3.—*Sarcophaga gigas* sp. n.: male terminalia. *a*, antero-lateral view of phallosome; *b*, upper surface of same; *c*, lower surface of same; *d*, distal end of same; *e*, sternite V; *f*, anterior clasper (a.c.) and posterior clasper (p.c.); *g*, lateral view of forceps and accessory plate; *h*, posterior view of forceps.

Wings.—Veins black. Anterior cross-vein under middle of section iii of costa ; latter equals section v of costa. Bend of IVth vein acute. Costal spine small or absent. Vein I bare.

Legs.—Middle femora : antero-ventrally, haired on basal $\frac{1}{6}$, followed by rather closely set, rather regular bristles, and a comb at apex ; postero-ventrally, with dense, curling hairs on basal $\frac{2}{3}$, and a comb at apex. Hind femora : antero-ventrally, with hairs along entire length, with addition of strong bristles at apical $\frac{1}{3}$; postero-ventrally, with long, curling hairs. Hind tibiae with long fringes antero- and postero-ventrally.

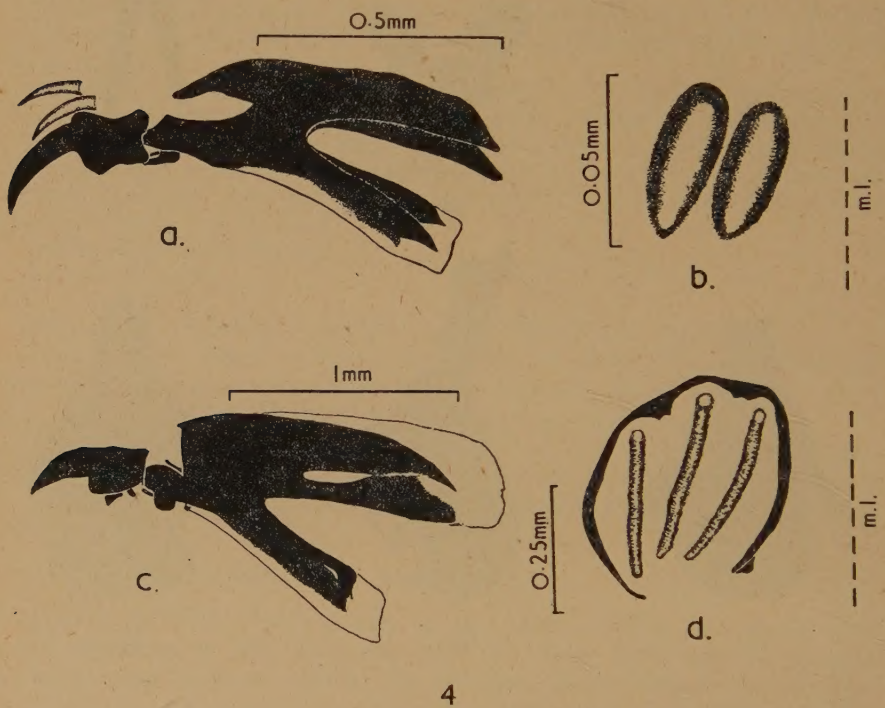

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Fig. 4.—Larval stages of *Sarcophaga gigas* sp. n. Cephalo-pharyngeal skeletons of first (*a*) and third (*c*) stage larvae. Stigmal plates of first (*b*) and third (*d*) stage larvae. m.l., median line.

Abdomen slate-grey pollinose. Tergite III with no median marginals. Sternites with sparse hairs, sternite IV may be pubescent only ; 1st *genital segment* dark brown, almost black, pollinated, no marginals ; 2nd segment shining black. The genital segments are large.

The male terminalia of *gigas* are illustrated in fig. 3. The forceps, as seen in profile, is thick and angulated. Its upper $\frac{2}{3}$ is covered with dense, wavy hairs, and the apical $\frac{1}{3}$ with coarse setulae. The claspers are simple. The phallosome is highly sclerotized.

Number of specimens examined : 20.

Female.—The female is similar to the male except for the usual sexual differences. The larvipositor is shown in fig. 5A.

Number of specimens examined : 15.

Bionomics.—This rather large species is a strong flier. It has been collected on carrion and human excrement; in the latter case a male and female were caught *in copula*. The species has also been observed feeding on sap from a wound in a deciduous tree (*Quercus serrata* Thunb.).

From this last situation a large female was captured, evidently gravid. On discovering that it was an interesting species, the first stage larvae from

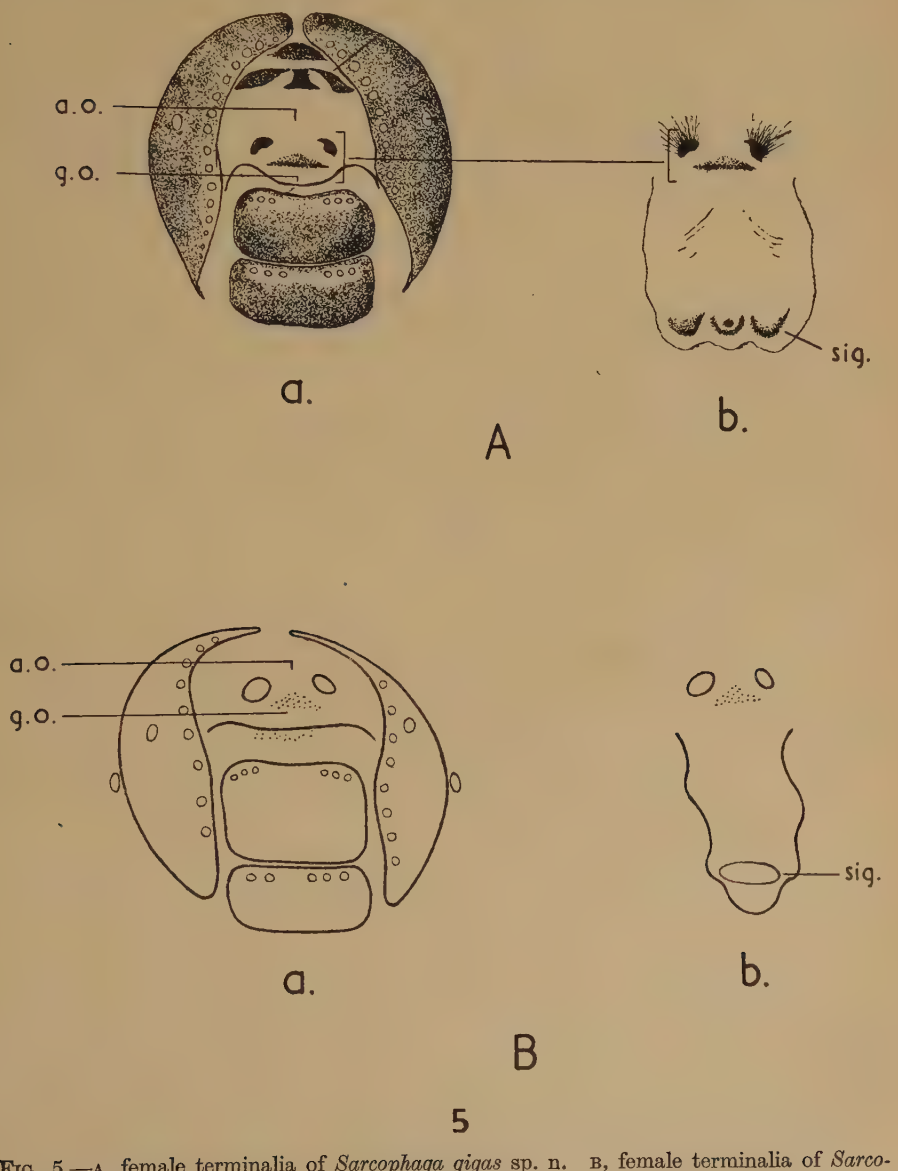

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Fig. 5.—A, female terminalia of *Sarcophaga gigas* sp. n. B, female terminalia of *Sarcophaga diminuta* sp. n. *a*, view of whole larvipositor; *b*, genital canal. a.o., anal opening; g.o., genital opening; sig., signum.

the abdomen were transferred to a liberal supply of cooked meat (8th July, 1944). On the 14th, the fully-grown larvae began to pupate; the last did so four days later, and the adult flies emerged from the 27th to the 31st. Under laboratory conditions, therefore, the development of the larvae was completed in about eight days, and the adults emerged about fourteen days after pupation. The average temperature during this period was 28° C.

The cephalo-pharyngeal skeletons of the first and final stage larvae are illustrated in fig. 4. When fully grown, the maggots attained a length of about 23 mm. The general structure and shape of the stigmal plate of the fully-grown larva are shown; the button is almost invisible. The diameter of the stigmal plate, measured along a line drawn through the centre of both plates, is 0·39 mm. The length, measured along a line drawn from the lower edge of the plate through the middle slit to the upper edge, measures 0·47 mm. The width, measured along a line drawn at right angles to the length in the middle of the plate, is 0·19 mm. The distance between the two plates is 0·24 mm. The puparium measures about 12 mm. in length and is mahogany-brown in colour.

Type-locality.—China: Chungking (Koloshan, 1800 ft.); June, 1944 (*H. T. Thomas*). *Type* and *allotype* will be sent to the National Institute of Health, Nanking, China; *paratypes*, males and females, are in the British Museum and in the author's collection.

The fact that this species cannot readily be fitted into Senior-White, Aubertin and Smart's key of male *Sarcophaga* (1940) will be discussed at the end of this paper.

Sarcophaga diminuta sp. n.

Length: 5·5–8 mm.

Male. Head.—Frons equals ½ (0·52) an eye-width. Lateral verticals undeveloped. Frontals 8 (maximum variation, 7–9), lower 2–3 widely diverging. Frontal stripe black, slightly ill-defined towards ocellar triangle, equal to or less than parafrontalia together at frons. Parafrontalia and parafacialia silvery pollinose, sparsely haired, those on latter strong. Antennae dark, 3rd segment varies from 2–3 × length of 2nd; arista short to moderately long plumose. Palpi black. Occiput with 3 rows of black hairs, but inner 2 rows usually indistinct. Buccal with black hairs anteriorly, pale hairs posteriorly.

Thorax yellowish pollinose. Acrostichals 0 : 1 (prescutellars). Postsutural dorsocentrals 3; presuturals 2–3, well developed; the dorsocentrals are of the type of *S. melanura* Meigen. Intra-alars 1 : 3 (1st postsutural bristle displaced medially). Propleura bare. Metathoracic spiracle chocolate.

Wings.—Veins dark. Anterior cross-vein under middle of section iii of costa; latter equal to section v of costa. Bend of IVth vein obtuse. Costal spine developed. Vein I bare.

Legs.—Middle femora: antero-ventrally, with 2–4 short bristles on basal ½, and a comb at apex; postero-ventrally, with short sparse hairs on basal ⅓, about 4 moderately long and rather strong bristles on middle ⅓, and a comb at apex. Hind femora: antero-ventrally, with about 3 moderately-long bristles irregularly spaced (excluding the usual sub-apical bristle); postero-ventrally, with practically no hairs but about 3 irregularly-spaced bristles. Hind tibiae with only a single row of sparse, very short hairs postero-ventrally—the tibiae may be considered to be bare.

Abdomen yellowish pollinose. Tergite III without median marginals. Sternites I–IV with moderately long hairs. *Genital segments* black; 1st segment thickly pollinated, a row of fine marginals; 2nd segment shining.

The male terminalia of *diminuta* are illustrated in fig. 6. The forceps, phallosome and other structures are black. The forceps are sickle-shaped, their apices are clawed, and moderately long hairs cover their basal $\frac{2}{3}$.

Number of specimens examined : 13.

Female.—The female was not caught *in copula*, but there is no doubt of its identity. It is similar to the male except for the usual sexual differences. The larvipositor is shown in fig. 5B.

Number of specimens examined : 21.

Bionomics.—Caught on rocks near hot springs.

Type-locality.—CHINA : Chungking (Peiwênch'üan) ; September, 1945 (*H. T. Thomas*). *Type* and *allotype* will be sent to the National Institute of Health, Nanking, China ; *paratypes*, males and females, are in the British Museum and in the author's collection.

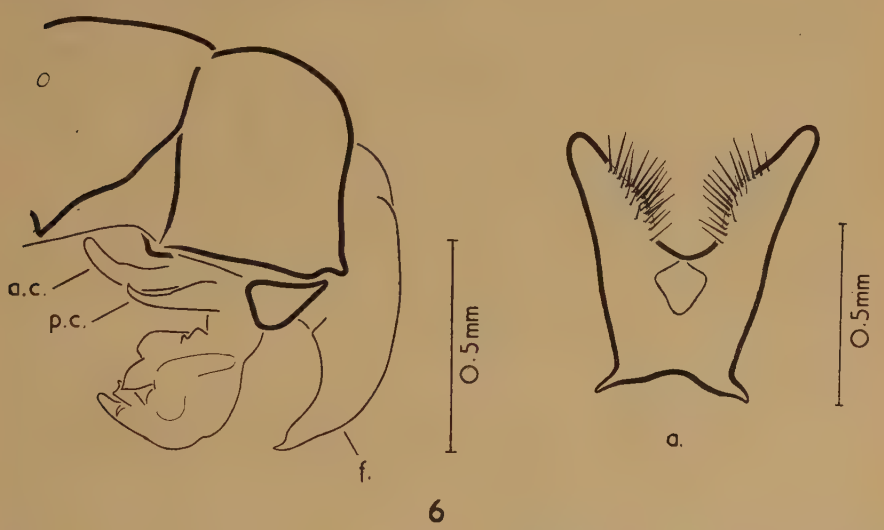

FIG. 6.—*Sarcophaga diminuta* sp. n. : male terminalia. *a*, sternite V. a.c., anterior clasper ; p.c., posterior clasper ; f, forceps.

This species runs to couplet 4 in the key to the species of *Sarcophaga* in Senior-White, Aubertin and Smart (1940). To fit it into the key, the couplet must be made into a triplet, the additional line of which reads :

Frons equal to half an eye. Genital segment 2 black. . . . *diminuta* sp. n.

S. caudagalli Böttcher bears a superficial resemblance to *S. diminuta*. The main characters which separate the two species are as follows : in *caudagalli* the frons is less than half an eye-width ; the third antennal segment is less than one and a half times the length of the second ; the buccae are covered entirely with black hairs ; the first genital segment is without marginal bristles ; and the structure of the phallosome and forceps in the two species is different.

Sarcophaga genuforceps sp. n.

Length: 8–10·5 mm.

Male. Head.—Frons 0·4 (variation, 0·4–0·5) of an eye-width. Lateral verticals undeveloped. Frontals 10 (maximum variation, 8–11), lower 3–4 widely diverging. Frontal stripe black, well defined, equal to or greater than combined width of parafrontalia at frons. Parafrontalia and parafacialia rich golden pollinose, very sparsely haired, those on latter moderately strong. Antennae dark, 3rd segment 2 × length of 2nd; arista long plumose. Palpi black. Occiput with 3 rows of black hairs. Buccal vestiture entirely black.

Thorax yellowish cinereous pollinose. Acrostichals 0:1 (prescutellars). Postsutural dorsocentrals 4, 1st bristle very weak; presuturals 4, developed; the dorsocentrals are of the type of *S. melanura* Meigen. Intra-alars 0–1 : 3. Propleura bare. Metathoracic spiracle chocolate.

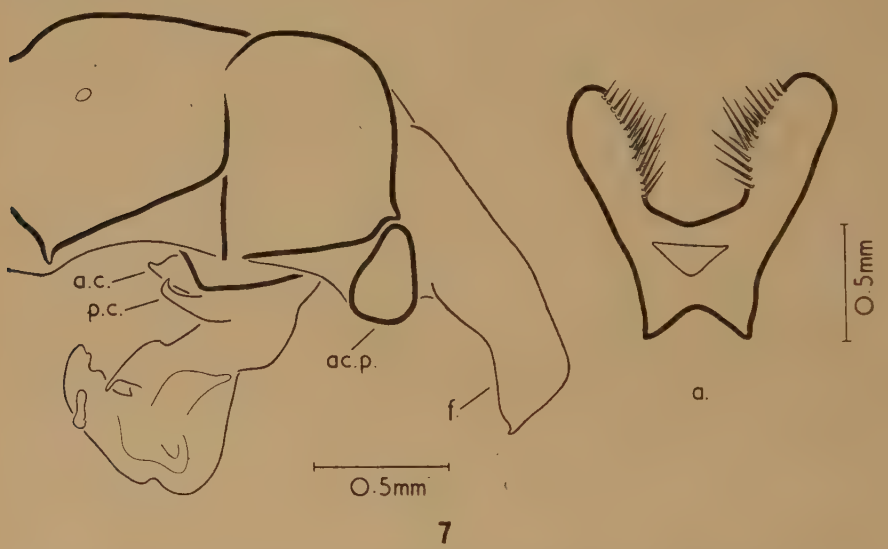

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Fig. 7.—*Sarcophaga genuforceps* sp. n. Male terminalia. *a*, sternite V. a.c., anterior clasper; p.c., posterior clasper; ac.p., accessory plate; f., forceps.

Wings.—Veins dark. Anterior cross-vein under middle or distal ½ of section iii of costa; latter equal to (1·1) section v of costa. Bend of IVth vein a right angle. Costal spine inconspicuous. Vein I bare.

Legs.—Middle femora: antero-ventrally, 2–4 short bristles basally, and a very fine recumbent comb apically; postero-ventrally, short sparse hairs on basal ½, with a comb following. Hind femora: antero-ventrally, with bristle-like hairs only (except the usual sub-apical bristle); postero-ventrally, with sparse, moderately long hairs. Hind tibiae with moderately-long fringes antero- and postero-ventrally, latter fringe more conspicuous (in one specimen, the fringes are almost entirely wanting).

Abdomen yellowish cinereous-pollinose. Tergite III with no median marginals. Sternites I, II and III with short sparse hairs, sternite IV with pubescence only. *Genital segments* dark brown; 1st segment thickly pollinated, without marginals; 2nd segment almost black, shining.

The male terminalia of *genuforceps* are illustrated in fig. 7. The forceps, claspers and particularly the accessory plates are brownish. The forceps, as seen in profile, is thick

and strong, and bent at about its middle ; the tip is minutely clawed. Short sparse hairs are found on the basal $\frac{2}{3}$ of the forceps, the other exposed parts are covered with minute coarse bristles. The claspers are small. The phallosome is highly sclerotized.

Number of specimens examined : 9.

Female.—Unknown.

Bionomics.—The specimens were taken on pine trees on the summit of a mountain (2800 ft.).

Type-locality.—China : Chungking (Chinyünshan) ; September, 1945 (*H. T. Thomas*). *Type* will be sent to the National Institute of Health, Nanking, China ; *paratypes* are in the British Museum and in the author's collection.

This species runs to *S. josephi* Böttcher in the key of male *Sarcophaga* in Senior-White, Aubertin and Smart, 1940 (couplet 6). *S. josephi* differs from this species, however, in the following points : there is a row of fine marginals on the first genital segment ; the second genital segment is lightly dusted; and the phallosomes of the two species are quite different. This species differs from *S. graciliforceps* sp. n. principally in the shape of the phallosome and forceps, and in the chaetotaxy of the inferior borders of the hind femora.

The Systematic Importance of the Postsutural Dorsocentral Bristles in Sarcophaga.

The series of postsutural dorsocentral bristles—of Oriental and Palaearctic forms certainly, and probably of all *Sarcophaga*—exists in three modifications : the *melanura*, *carnaria* and *albiceps* types. In the *melanura* type, there are 3 long bristles and there may be a small bristle in front of the first of these ; in the *carnaria* type, there are 4 long bristles ; and in the *albiceps* type, there are about 5 bristles, which increase markedly in length and strength progressively from the first to the last. Clearly, it is not the number of dorsocentrals present which is important, but the character of the bristles, as indicated here.

Senior-White, Aubertin and Smart (1940) begin their key to the species of *Sarcophaga* with a triplet which makes use of differences in the *number* of postsutural dorsocentral bristles, the triplet running as follows :

Posterior dorso-centrals 3 . . . .
Posterior dorso-centrals 4 . . . .
Posterior dorso-centrals 5–6 . . . .

According to their interpretation of the postsutural (posterior) dorsocentral bristles, *S. albiceps* Meigen, for example, has 4 of these and in this respect differs from *S. fuscicauda* Böttcher which they regard as having 5. Their descriptions of the two species thus place the species in two different sections in the key. In both *albiceps* and *fuscicauda*, however, the series of postsutural dorsocentrals consists of a variable number of bristles—about 5. (Since the first few are considerably smaller than the rest, it is often difficult to decide how many of them should be counted.) The series of bristles increase in size in an ascending order from the first to the last. These two species in fact fall under the heading of the *albiceps* type as already defined, and these examples

show that the second and third lines of triplet 1 refer to one and the same condition, namely, to the *albiceps* type. It is to be noted that when Senior-White, Aubertin and Smart speak of 4 postsutural dorsocentrals, they apparently do not have in mind the *carnaria* type as defined here.

S. gigas sp. n. has postsutural dorsocentrals of the same type as *S. albiceps* or *S. fuscicauda*, for example, and it cannot be inserted into Senior-White, Aubertin and Smart's key, inasmuch as there is no criterion by which to decide whether a specimen of the *albiceps* type should be referred to the second or to the third lines of triplet 1.

In the present state of our knowledge of the genus *Sarcophaga*, it is often difficult or impossible to decide what are the near relatives of a species. A small amount of work has been done, however, on the natural grouping of certain species, e.g. the *albiceps* group (Ho, 1932) and the *dux* group (Parker, 1919). The phallosome of *gigas* has no affinity with the phallosomes of the members of these groups, or indeed, with the phallosome of any other species known to the author. In fact, it is doubtful whether our present knowledge of the genus is sufficient, except in a few special cases, to justify any attempt to relate new species to forms already described.

References.

Ho, C., 1932, *Bull. Fan Mem. Inst. Biol.* **3** : 345.

Parker, R. R., 1919, *Bull. Brooklyn ent. Soc.* **14** : 41.

Rohdendorf, B. B., 1937, *Faune de l'URSS* **19** : Part. 1. *Diptères.* Sarcophagidae.

Senior-White, R., Aubertin, D., and Smart, J., 1940, *Fauna of British India, Diptera* **6** : Calliphoridae.

Book Notice.

The Butterflies and Moths (Macrolepidoptera and Pyrales) found in the Dover and Deal District of Kent. By Bernard Embry, F.R.E.S., and George H. Youden, F.R.E.S. 8vo. Dover (Buckland Press), 1949. Pp. ix + 61. Price 5s. 6d.

The area covered by this list is given as "a line starting on the Cliffs at Capel, some 4 miles S.W. of Dover, and running north-westwards through Elham to Stelling Minnis, 7 miles south of Canterbury. Thence north-eastwards through Kingston, Adisham and Ash to the coast, 2 miles N.E. of Sandwich." It comprises about 130 square miles.

A foreword describes the types of vegetation found in the area and analyses the species listed, with notes on earlier lists and records from this area. A list of place-names gives 43 localities.

Rhopalocera (59) and Heterocera (537) are listed and numbered, with scientific and English names, and notes on occurrence and frequency. Pyrales (136) are merely listed. There is an index of scientific names.

NEW SPECIES OF STAPHYLINIDAE (COL.) FROM FORMOSA.

By Malcolm Cameron, M.B., R.N., F.R.E.S.

Cryptobium formosae sp. n.

Black, shining, the posterior margin of the elytra broadly red, the posterior margins of the 7th and 8th tergites narrowly reddish yellow. Antennae reddish yellow, the 3rd to 5th segments a little infuscate. Legs pale yellow. Length 6·75 mm. In build and antennal structure very similar to *Cryptobium abdominale* Motschulsky, but differs in the elytra being much less extensively red and the 7th and 8th tergites only narrowly and obscurely reddish yellow posteriorly, the eyes a little smaller, the puncturation of the head coarser and on the front more or less longitudinally rugose, whereas in *abdominale* the punctures are simple and do not coalesce ; thorax more shining with broader, smooth, central area and coarser puncturation elsewhere, the elytra also more coarsely punctured.

♂. Unknown.

Takesaki : near Kagi. 20.iii.38 (*Yano*).

Xantholinus formosae sp. n.

Shining black, the elytra reddish yellow, sometimes a little infuscate at the base ; thorax with dorsal row of eleven punctures. Antennae, mouth parts and legs reddish yellow, the first segment of the first darker than the following. Length 6·5 mm.

Head a little longer than broad, as broad as the thorax, the post-ocular region longer than the eye and distinctly retracted to the rounded posterior angle ; median interocular grooves rather long, slightly converging behind and terminated by an umbilicate puncture, the lateral short and feeble, external to the median sulci with a row of 5 or 6 small close punctures, elsewhere with a few small scattered punctures, the disc practically impunctate. Antennae short and stout, 2nd and 3rd segments of equal length, 4th small, transverse, 5th to 10th increasing in width, the penultimate three times broader than long, the 11th stout, as long as the 8th to 10th together. Thorax longer than broad (4 : 3), the sides straight and retracted to the base with dorsal row of about 11 punctures, of which the posterior 5 form a regular row, the anterior 6 placed irregularly, externally with a row of 4 or 5 smaller ones. Elytra broader and slightly longer than the thorax with a sutural row of 9 or 10 punctures, a humeral of 13 or 14, an intermediate of varying number. Abdomen sparingly punctured, more closely on the 7th tergite ; pubescence long and scanty, the ground sculpture feeble, absent on the fore-parts.

Funkiko : near Mt. Ari. 16.v.38 (*Yano*).

Neobisnius formosae sp. n.

Shining black, the elytra pitchy, the suture and posterior margin very narrowly and obscurely lighter. Antennae black, the first three segments and legs reddish yellow, the posterior femora infuscate. Length 3·75 mm. In size and build much like *prolixus* Gr., the antennae similarly constructed, but with larger eyes and the post-ocular region more retracted to the base, the punctures smaller and less close, thorax with smaller and less close punctures, elytra differently coloured, the punctures finer and more superficial, abdomen much more coarsely punctured, yet more coarsely than in *Neobisnius pumilus* Sharpe. Ground sculpture absent throughout.

Takesaki : near Mt. Ari. 12.xii.39 (*Yano*). Unique.

Philonthus formosae sp. n.

Shining; head and thorax dark blue, the latter with dorsal row of four punctures, the mouth parts pitchy; elytra more brilliant violet blue; scutellum and abdomen black. Antennae and legs black. Length 10 mm. In build and antennal structure much like *Philonthus politus* L., but differently coloured, the elytra more strongly punctured, the abdomen less closely punctured with longer, coarser and more sparing pubescence. ♀: Head transverse, subquadrate, very slightly narrower than the thorax, the eyes large, as long as the post-ocular region, the median interocular punctures widely separated, between the eye and the neck with 8 or 9 punctures; ground sculpture very fine, striate. Thorax very slightly longer than broad, external to the dorsal row of punctures with 2 others; ground sculpture as on head. Scutellum closely punctured. Elytra longer and broader than the thorax, rather coarsely and closely punctured, the sides with rather long setae; ground sculpture absent. Abdomen rather coarsely and sparingly punctured, more closely at the bases of the anterior tergites and with long black setae; ground sculpture absent.

TOROON: near Mt. Ari. 17.v.38 (*Yano*). Unique.

Quedius (Microsaurus) insulanus sp. n.

Black, shining, the abdomen slightly iridescent. Antennae and legs black. Length 9 mm. In size and build scarcely differing from *Quedius nigrocaeruleus* Fauvel, but with the penultimate segments of the antennae scarcely transverse, the eyes a little longer, the thorax with dorsal row of three punctures as in that species, puncturation of elytra about as close but finer; abdomen less closely punctured, the pubescence longer and coarser. The ground sculpture of the head and thorax extremely fine, the elytra and abdomen without ground sculpture.

Near Mt. Ari. 6.vi.38 (*Yano*). Unique.

Quedius (Indoquedius) formosae sp. n.

Shining black, abdomen iridescent. Antennae and legs red. Length 8 mm. Near *Quedius praeditus* Sharpe, but with shorter more coarsely punctured elytra, these shorter than the thorax (5 : 6·5), in other respects very similar.

FORMOSA: Tamari, Taito. viii.1934 (*Yano*). Unique.

Atheta (Coprothassa) formosae sp. n.

Head and thorax black, elytra yellow, the postero-external region infuscate; abdomen with the first two visible tergites yellowish red, the following black. Antennae with the first three segments reddish yellow. Legs reddish yellow. Length 3 mm.

Size, build and lustre of *Atheta sordida* Marsham, but differing in the darker antennae with the penultimate segments more transverse and the 11th shorter, the elytra infuscate postero-externally and the colour of the abdomen. The head is a little broader, the puncturation rather finer, the sculpture of the thorax scarcely differs from that of *sordida*, that of the elytra less fine and rougher, the abdomen more sparingly punctured on the penultimate tergites.

FORMOSA: Karapin, near Mt. Ari. xi.v.38 (*Yano*). Two examples.

The types of all the above species are in my own collection.

TWO NEW SPECIES OF *PEZOTETTIX* BURMEISTER, 1840 (ORTHOPTERA: ACRIDIDAE).

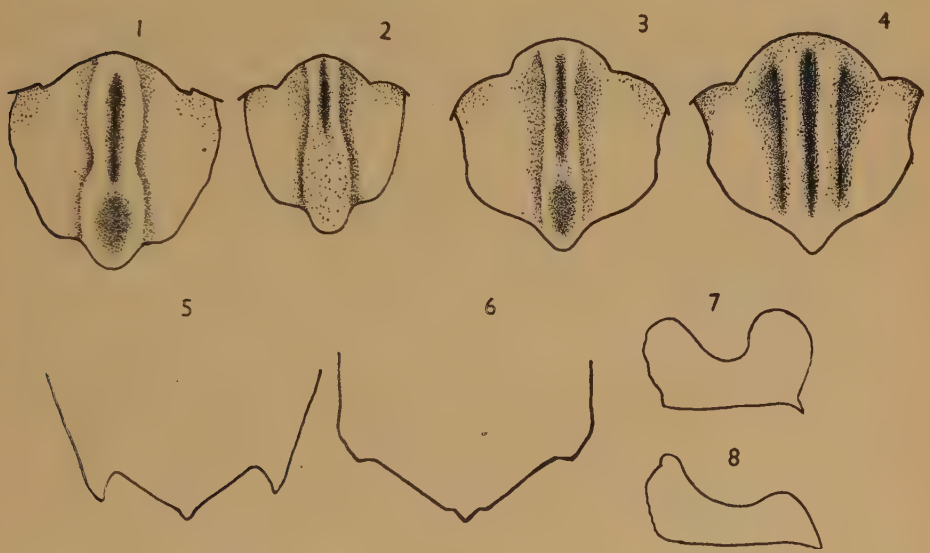
By V. M. Dirsh, D.Sc.

(*Anti-Locust Research Centre.*)

Pezotettix cypria sp. n. (figs. 2, 5, 7, 9, 13).

Close to *P. judaica* Uvarov (1934), but differs in the shape of the male cercus, supra-anal plate, elytra and the hind knee.

Male (type).—Antennae somewhat less than two-thirds of the head and pronotum together; fourth joint as long as broad, scarcely shorter than the fifth. Frontal ridge



Figs. 1–8.—(1) *Pezotettix anatolica*, male supra-anal plate; (2) *P. cypria*, ditto; (3) *P. judaica*, ditto; (4) *P. cotti*, ditto; (5) *P. cypria*, female subgenital plate; (6) *P. cotti*, ditto; (7) *P. cypria*, male cercus; (8) *P. cotti*, ditto.

flat, with parallel margins. Fastigium of vertex concave, with carina weak, becoming stronger on the occiput. Elytra short, broad, with almost straight posterior margin and strongly convex anterior margin; apex broadly rounded. Upper lobe of the hind knee scarcely projecting beyond the lower, with obliquely cut posterior margin and rounded angles. Supra-anal plate longer than broad, with a feeble projection in the middle of the lateral margin; apex triangular, obtuse; along the middle of supra-anal plate, from base to apex, there run two parallel ridges with a deep sulcus between them. Cercus short; apical part moderately curved; lower margin straight; upper margin deeply roundly excised; apical part above with a large, rounded lobe projecting upwards and backwards; lower part of the apex obliquely cut; lower angle of the apex with a large tooth directed downwards and backwards.

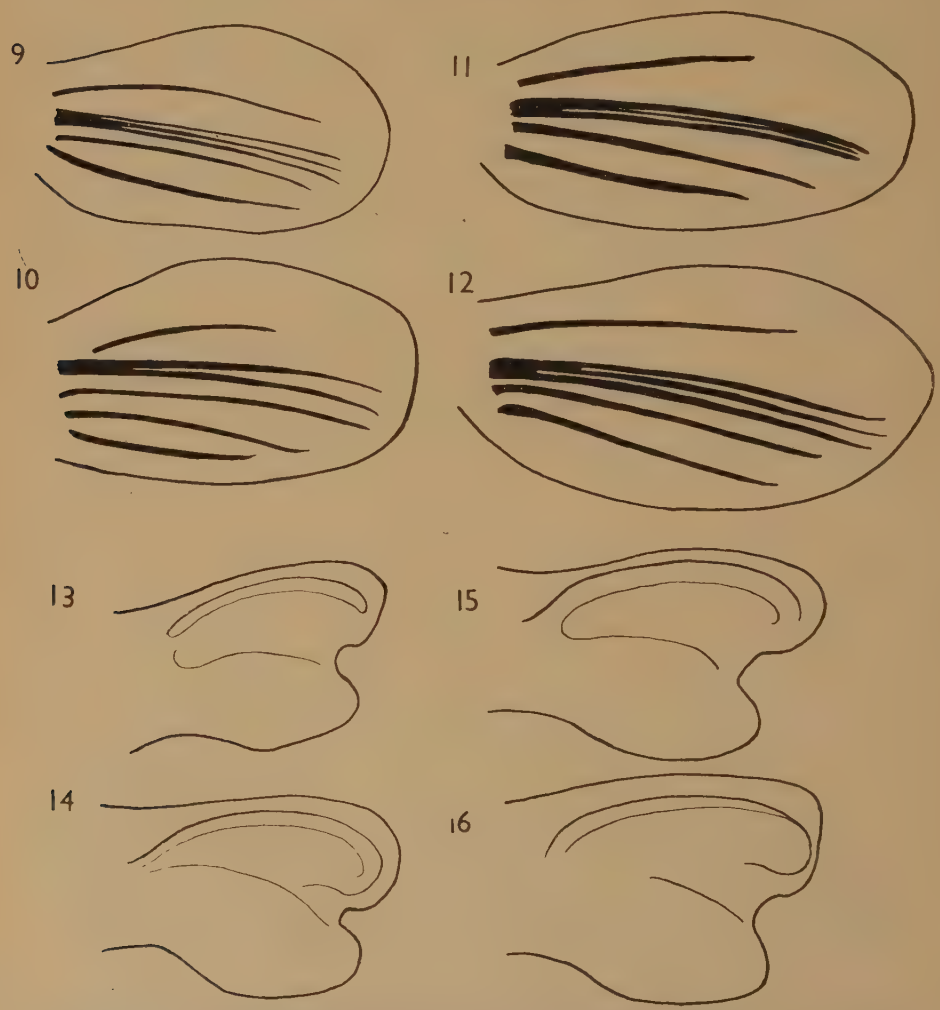
Coloration dirty yellow-brown. The dark spot on the second tergite at the base of hind femur scarcely marked. Hind femur with two dark fasciae, indistinct on the outside and distinct on the inside.

Female (paratype).—As the male but larger. General coloration darker. Subgenital plate trilobate; lateral lobes acutely triangular; apex triangular.

Total length, ♂ 13, ♀ 16·5; pronotum, ♂ 3·3, ♀ 4; hind femur, ♂ 8, ♀ 9; elytra, ♂ 2·5, ♀ 3; antennae, ♂ 3, ♀ 4 mm.

Cyprus: Stroumbi, 21.ix.1946. 3 ♂ (including type): Para-Pedi Hills, 6.x.1937, 1 ♀ (paratype) (*G. A. Mavromoustakis*).

This species, *P. judaica* Uvarov and *P. platycerca* Stål form one group characterized by the shape of male cercus with strongly expanded apical part



Figs. 9–16—(9). *Pezotettix cypria*, male elytron; (10) *P. judaica*, ditto; (11) *P. cotti*, ditto; (12) *P. anatolica*, ditto; (13) *P. cypria*, hind knee; (14) *P. judaica*, ditto; (15) *P. cotti* ditto; (16) *P. anatolica*, ditto.

and a strong tooth on the lower apical angle. From the nearest species, *P. judaica*, the new species is distinguished by the deeper excision of the upper margin and more convex apical part of male cercus. Females of these two species present no differences.

Pezotettix cotti sp. n. (figs. 4, 6, 8, 11, 15).

Close to *P. anatolica* Uvarov (1934), but smaller, more slender and differs in the shape of the male cercus, hind knee and the supra-anal plate.

Male (type).—Antennae as long as two-thirds of the head and pronotum together; fourth joint broader than long and shorter than the fifth. Frontal ridge flat, scarcely widened above the ocellum. Fastigium of vertex concave with the middle carina weak, reaching the base of occiput. Elytra elliptical, slightly projecting beyond the second tergite. Upper lobe of the hind knee rounded, projecting considerably beyond the lower. Supra-anal plate somewhat longer than broad; apex with a large rounded projection; along the middle of the supra-anal plate, from base to apex, there is a convexity with the margins parallel in the basal half and diverging in the apical; the basal part of the convexity with a deep longitudinal sulcus, the apical part weakly concave. Cerci strongly and regularly curved; lower margin almost straight, upper margin weakly rounded excised, in apical part scarcely widened; apex obliquely cut; lower angle weakly attenuated. Apical part of cercus concave on the outside.

Coloration dirty yellow-brown with a red tinge. Second tergite at the base of hind femur with a dark, almost black spot. Hind femur on the outside with two indistinct, on the inside distinct, dark fasciae; the basal fascia being incomplete.

Female (paratype).—Larger and more robust. The dark tergal spot at the base of hind femur is prolonged as a stripe disappearing at the middle of abdomen. Apex of subgenital plate with a rectangular projection in the middle and with two smaller lateral ones; lateral lobes weakly developed.

Total length, ♂ 13, ♀ 16; pronotum, ♂ 3·5, ♀ 4; elytra, ♂ 3, ♀ 3·5; hind femur, ♂ 8, ♀ 10; antennae, ♂ 4, ♀ 4·5. Total length of paratypes: ♂ 12–14, ♀ 15–17 mm.

Lebanon: Bsjerri (Besharre), 19.viii.1944. 8 ♂ (including type), 7 ♀ (*H. B. Cott*).

P. anatolica Uvarov, *P. silvestrii* Jannone, *P. lagoi* Jannone and *P. cotti* form one group of very similar species, united by the common feature of the shape of male cercus. From the nearest species, *P. anatolica* Uvarov, *P. cotti* is distinguished by the shape of the upper lobe of hind knee which in *P. anatolica* is straight, obliquely cut on apex and has rounded angles; and by the shape of elytra, which in *P. anatolica* are broader, with more convex anterior and posterior margins and more acute apex. From *P. silvestrii* and *P. lagoi* the new species differs in the male supra-anal plate, which in those two species has triangularly projecting apex, while in *P. cotti* the projection is rounded, and by the shape of male cercus, which in *P. silvestrii* and *P. lagoi* have the apical part more prominent, and have deeper excision of upper margin of the cercus.

The types of both new species are in the British Museum (Natural History).

ON THE GENUS *LEPTOSTETHUS* WATERHOUSE (COL., CURCUL.).

By Sir Guy A. K. Marshall, D.Sc., F.R.S.

The subfamily Leptopinae, to which the genus *Leptostethus* belongs, finds its highest development in America (especially in the tropical areas), from which 75 genera have been recorded, Australasia coming next with 31 genera ; while the Oriental Region has only 8, the Palaearctic 4, and continental Africa 4.

Of the African genera, *Orimus* Schönherr was placed by Lacordaire in the tribe Strangaliodini ; but the identity of the genus is unfortunately in doubt, and it is at present uncertain whether any authentic specimen is still extant. Schönherr described the unique species in 1843 from a single specimen found by a German druggist, Drege,[1] who had a business in Port Elizabeth. Unfortunately, Schönherr returned to Drege all his species that were described from single specimens, and I have so far failed to trace any of these numerous missing unique types, although some unnamed specimens collected by Drege (apparently later) found their way into the Roelofs collection, now in the Brussels Museum.

Lacordaire redescribed the genus and species in his *Genera des Coléoptères*, but certain discrepancies between this description and that of Schönherr render it doubtful whether Lacordaire had before him an authentic specimen of *O. cinctus* Boh. From Schönherr's description of the structure of the scrobes it seems doubtful whether the genus should properly be included in the Leptopinae, and it would perhaps be better to place it provisionally in the Eremninae, a subfamily well represented in South Africa.

The three remaining genera, *Leptostethus* Waterh., 1853, *Enicoderus* Pér., 1892, and *Timus* Pér., 1892, have all been referred to Lacordaire's tribe Leptostethini, which is peculiar to south-western Africa. Of these, *Timus* was previously unknown to me, but owing to the kindness of Dr. A. J. Hesse, of the South African Museum, I have now been able to examine typical specimens of all three of Péringuey's species. As a result, I have found it impossible to find any reliable character by which to separate *Timus* from *Enicoderus* ; moreover, the same difficulty arises regarding the relationship between these two genera and *Leptostethus*, and I am satisfied that both Péringuey's genera must sink as synonyms of *Leptostethus*.

There are thus nine known species in the genus, and two additional undescribed forms represented in the British Museum (Natural History). The following key may serve to facilitate their determination.

The genotype of *Leptostethus* has not previously been fixed ; two species were originally included : *marginatus* Waterh. and *waltoni* Waterh., and of these the former is now selected as the genotype. In the case of *Timus*, two species were described originally, *simplex* Pér. and *planiceps* Pér., and *dives* Pér. was added later ; *simplex* is now selected as the genotype. *Enicoderus* hitherto

[1] Schönherr writes the name as Drège, as though it were French, but Dr. F. van Emden informs me that he has clear evidence that the accent is an error and that the man was a German.

contained four species : *thoracicus* Pér., *latifrons* Mshl., *anatirostris* Mshl. (1926, omitted from the Catalogue) and *viridicollis* Mshl. (1938); *thoracicus* is automatically the genotype.

Key to the Species of *Leptostethus*.

1 (18) Males.

2 (3) Pronotum with two large rounded elevations on the posterior half, each bearing a tuft of erect setae ; rostrum rapidly dilated beyond the middle into a sharp angle on each side, the distance from angle to angle equal to the length of the rostrum *thoracicus* Pér.

3 (2) Pronotum without elevations ; rostrum not thus angularly dilated.

4 (11) Dorsum of rostrum more or less roundly dilated laterally, the margin being carinate and overhanging the scrobes.

5 (6) Head granulate ; pronotum with bright green scales ; elytra with a sutural and broad marginal stripes of whitish to orange scales ; femora bright red ; posterior tibiae without teeth *viridicollis* Mshl., 1938.

6 (5) Head not granulate ; pronotum with brown or grey scales ; elytra without pale stripes ; femora black or piceous ; posterior tibiae with strong teeth.

7 (8) Front coxae subcontiguous ; dorsum of rostrum only slightly narrowed at the base ; head with a strong ridge above the eyes, which is continuous with the lateral carina of the rostrum (fig. 1, *c*) *glabrirostris* sp. n.

8 (7) Front coxae as widely separated as the middle pair; rostrum strongly narrowed at the base ; head without definite supra-ocular ridges.

9 (10) Rostrum with the lateral carina running almost straight from the middle to the base, the space between the end of the carina and the eye less than half as long as an eye ; prothorax strongly rounded laterally, widest at the middle, with the smooth apical area extending broadly down to the post-ocular lobes *anatirostris* Mshl., 1926.

10 (9) Rostrum with the lateral carina curving strongly inwards at the base and nearly joining the one on the other side (fig. 1, b), its distance from an eye being $\frac{3}{4}$ the length of an eye ; prothorax moderately rounded laterally, widest much in front of the middle with the smooth apical area narrowing laterally and ending well above the post-ocular lobes . . *pinacorrhinus* sp. n.

11 (4) Rostrum almost parallel-sided or narrowed apically, without any overhanging lateral carina.

12 (17) Prothorax broader than the elytra, which are not mucronate at the apex ; head and rostrum with short erect setae ; upper surface squamose ; length 7–9 mm.

13 (16) Front coxae separated, metasternum longer than a middle coxa ; head with a small ridge above each eye ; elytra with very short recumbent setae, the alternate intervals not raised.

14 (15) Rostrum parallel-sided, the genae not projecting, the apical declivity flat transversely ; prothorax with the front margin level with the head ; front coxae very narrowly separated, hind tibiae with small denticles . . . . . *simplex* Pér.

15 (14) Rostrum narrowed from base to antennae, so that the genae appear slightly prominent (fig. 1, a), the apical declivity transversely convex; prothorax with the front margin slightly raised above the head; front coxae more widely separated, hind tibiae with strong teeth . . . . . *planiceps* Pér.

16 (13) Front coxae contiguous, metasternum a little shorter than a middle coxa; head without supra-ocular ridges; elytra with long erect setae, the alternate intervals slightly higher *latifrons* Mshl.

17 (12) Prothorax not broader than the elytra, which are jointly mucronate at the apex; head and rostrum devoid of setae; upper surface devoid of scales; length 17–18 mm. *marginatus* Waterh.

18 (1) Females.

19 (22) Front coxae subcontiguous; elytra not mucronate.

20 (21) Pronotum strongly convex longitudinally, with two tufts of erect setae on the disk; elytra with short, recumbent setae *thoracicus* Pér.

21 (20) Pronotum gently convex, without tufts of setae; elytra with long, erect setae. . . . . *latifrons* Mshl.

22 (19) Front coxae distinctly separated; elytra with short mucros.

23 (30) Upper surface more or less densely squamose; length 6–11 mm.

24 (25) Basal angles of the prothorax produced shortly and acutely backwards; elytra parallel from the base to $\frac{2}{3}$, with green scaling and a broad denuded stripe on each . . . . . *dives* Pér.

25 (24) Basal angles of prothorox not produced backwards; elytra rounded laterally, usually widest behind the middle; without any green scales.

26 (27) Head without granules; prothorax as wide at the apex as at the base; femora black . . . . . *anatirostris* Mshl., 1926

27 (26) Head with low granules; prothorax with the apex much narrower than the base; femora red with the apex darker.

28 (29) Rostrum with a strong median carina, the apical area sloping gradually, without any median depression and with short erect setae; pronotum with bright green scales; elytra with a sutural and very broad marginal stripes of whitish to orange scales, the posterior half with erect setae . *viridicollis* Mshl., 1938

29 (28) Rostrum without any median carina, its apical area almost vertically declivous, with a broad median depression and without setae; prothorax and elytra with uniform greyish-brown scales and very short recumbent setae . . . . *waltoni* Waterh.

30 (23) Upper surface entirely devoid of scales; length 18 mm. *marginatus* Waterh.

Leptostethus glabrirostris sp. n. (fig. 1, c).

♂. Dull black, with uniform dense greyish brown scales above and mixed brown and whitish scales beneath, the latter predominating.

Head rugulose, but the sculpture concealed by dense brown scales and with stiff, erect setae; frons flat in both directions, with a distinct ridge above each eye. *Rostrum* very nearly as broad as long, rounded laterally, widening very gradually from the base to the middle and there narrowing more rapidly to the apex, the lateral margin formed by a sharp raised carina which overhangs the lateral area and unites basally with the supra-ocular ridge on the head; the apical area sloping only gradually, rugulose, with brown scales behind and white scales in front; dorsum very broad and almost flat, entirely devoid of scales (perhaps partly abraded), with scattered small punctures and very feeble wrinkles, and with a broad depressed area across the base which is almost impunctate.

Prothorax as long as broad, moderately rounded laterally, widest at the middle, truncate at the base, gently arcuate dorsally at the apex; dorsum moderately convex, highest at the middle, with close rugose granulation, densely squamose and with short erect setae, the smoother apical area continued laterally down to the post-ocular lobes. *Elytra* elongate, subcylindrical, narrower than the prothorax, jointly sinuate at the base, the angles of which do not project, with very short, separate, apical mucros; the striae with strong regular punctures which are only slightly enlarged near the base, the intervals not wider than the striae and with a row of short recumbent setae, the apical margin with a sparse fringe of longer, stiff, erect setae. *Legs* black, with dense brown scales and erect pale setae, the hind femora with a subapical whitish band; front coxae subcontiguous; front tibiae only slightly curved above, with 4 or 5 strong sharp teeth below, the posterior pairs with rather shorter teeth.

Length 9 mm., breadth 2·5 mm.

South-West Africa: Aus, 1 ♂, xii.1929 (*R. E. Turner*).

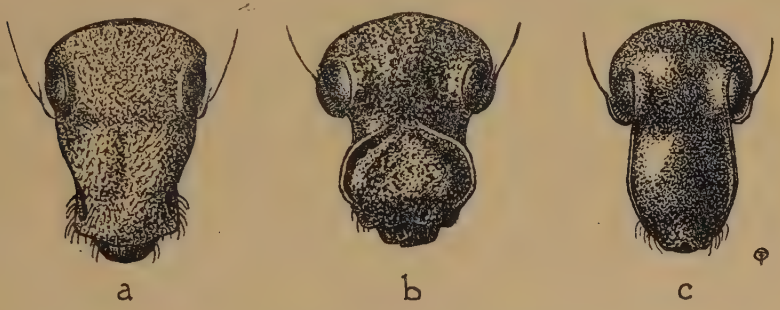


Fig. 1.—Head and rostrum of male *Leptostethus*: a, *planiceps* Pér.; b, *pinacorrhinus* Mshl.; c, *glabrirostris* Mshl.

Leptostethus pinacorrhinus sp. n. (fig. 1, b).

♂. Derm black, with greyish-brown scales above and uniform whitish scales beneath.

Head (when abraded) with the punctures varying from coarse, shallow and close to fine and remote; frons longitudinally convex, without any supra-ocular ridges. *Rostrum* a little broader than long, strongly rounded laterally, widest at the middle; the apical area steeply declivous, almost flat transversely, with white scales; dorsum subconcave, very broad, the sharp elevated marginal carina curving strongly inwards on to the disk far before the base and nearly meeting the carina of the opposite side, the disk bare (? abraded) with larger remote punctures and numerous smaller ones in between, the basal part behind the carina smooth and more finely punctate. *Prothorax* a little broader than long, moderately rounded laterally, widest at about one-third from the apex, which is dorsally arcuate and slightly narrower than the truncate base; dorsum almost flat longitudinally, rugose, with subconfluent low granules and a shallow median sulcus, which is distinct only near the base, densely squamose and with short, recumbent setae; the smoother apical area rapidly narrowing laterally and ending well above the post-ocular lobes. *Elytra* elongate, subcylindrical, not wider than the prothorax, jointly sinuate at the base, the angles of which do not project, with short, sharp, separated, apical mucros; the striae with strong, close, regular punctures which are almost uniform throughout, the intervals not wider than the striae and with a row of very short recumbent setae. *Legs* piceous, with dense pale scales; front coxae as widely separated as the median pair; all the tibiae with a few strong, erect teeth, the front pair slightly curved.

Length 6·5–7·5 mm., breath 1·8–2·0 mm.

Bechuanaland: Molopo R., below Witdraai, 7 ♂, v.1948 (*C. Koch*).

THE LINNAEAN NAMES OF INDO-AUSTRALIAN RHOPALOCERA. PART 6. THE CASE OF *PAPILIO PLEXIPPUS* LINNAEUS, 1758.

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The Linnaean Collection of Butterflies.

Among the several authors who have published numerous inadequate descriptions of Rhopalocera, and whose names have been determined subsequently by a study of the material remaining in their collections, may be mentioned W. C. Hewitson (1806–1878), C. and R. Felder (1814–1894) and H. Fruhstorfer (1866–1922). It has never been suggested, to my knowledge, that the specimens on which these authors based their descriptions, although not marked as types in most cases, should be ignored in preference to any published figures they may have cited in their descriptions. References to figures are often misleading, unless the author himself had access to the actual specimens on which the figures were based and very rarely is such the case. Indeed, with Linnaeus, there is evidence to show that he frequently cited figures which he had not seen on the recommendation of other naturalists, and doubtless this explains some of his astonishing determinations of Seba's figures in *Edition xii* of *Systema Naturae*.

At first sight, it may seem surprising that, in view of their fundamental importance in systematic zoology, the Linnaean names of butterflies were not determined years ago on the basis of the specimens in the Linnaean Collection, but there has been at least one serious deterrent in the way. When Sir James Edward Smith acquired the Linnaean Collection in 1784, he amalgamated it with his own, and, quite unfairly as it transpired, he subsequently acquired a reputation for changing the labels. As many of the Linnaean specimens reached Smith without labels, it is not surprising, perhaps, that the Collection came to be regarded as of somewhat dubious scientific value. When Mr. W. H. T. Tams and I made a thorough examination of the Linnaean Collection in 1941, we were struck by the almost complete absence of any evidence of label changing: with very few exceptions, the old labels had only a single pinhole, and we took this to mean, not that Smith was always careful to replace the pin in the same hole, as was suggested by Norman (1942, *Proc. linn. Soc. Lond.* **154**: 53), but that Smith never removed Linnaean labels. All who have worked with pinned entomological specimens know the reason against inserting the pin in the old hole when changing or refixing a label.

In general, there is no great difficulty in recognizing the authentic specimens in the Linnaean Collection. Most of Linnaeus' butterflies were described and named by him in one or more of his works, and, in his own copies of *Editions x* and *xii* of *Systema Naturae*, Linnaeus marked in ink the names of the species of insects represented by specimens in his own collection. As far as the Oriental butterflies are concerned, all these specimens still remain in the Linnaean Collection and, with the single exception of *Papilio almana*, they all bear name labels in the handwriting of Linnaeus. The Collection also

contains several specimens described by Linnaeus, some of them with name labels in Linnaeus' handwriting, which are not marked in Linnaeus' copies of *Systema Naturae* as being in his collection. In general, these authentic Linnaean specimens can be recognized by the pins, and especially is this the case with most of the Cantonese butterflies obtained by Osbeck in 1751, which are mounted on long, black, headless pins.

Not all the type specimens of the Linnaean names of butterflies are to be found in the Linnaean Collection, however. At the time of writing the *Tenth Edition*, Linnaeus had access to the magnificent collection of Lepidoptera and Mollusca in the possession of Queen Ludovica Ulrica at Drottningholm, and the species he described from the Queen's Collection are marked with the letters " M. L. U." in the *Tenth Edition*. As far as the Cantonese butterflies are concerned, the Queen possessed approximately the same species as were found in the Linnaean Collection, but she had also many specimens from Amboina, whence Linnaeus had no material. In his descriptions in *Edition x*, Linnaeus often fell into errors regarding the location of the specimens described : for instance, he marked *Papilio paris* and a few others as " M. L. U.", although the species were represented only in his own collection. The Queen's Collection is still extant at Upsala, and has been the subject of a comprehensive monograph by Aurivillius (1882, *Recensio critica Lepidopterorum Musei Ludovicae Ulricae quae descripsit Carolus a Linné*, Stockholm).

Plates 13 to 16 of volume 1 (published 1759) and the unpublished supplementary plates 4 to 8 and 10 of Clerck's *Icones Insectorum rariorum* (Stockholm), depict specimens of butterflies which appear to be those in the Linnaean Collection which were obtained by Osbeck in Canton. The plates in volume 2 of the *Icones* are of specimens in the collection of Queen Ludovica Ulrica, those on plates 17 to 45 being of butterflies which are mostly from Amboina. It is believed that the trivial names under the butterflies depicted in the *Icones* are in the handwriting of Linnaeus.

Still remaining at Stockholm are certain of Linnaeus' private note-books, written about 1751, and containing descriptions of the butterfly species known to him. Aurivillius showed that, in many cases, these descriptions were changed somewhat when they were transcribed for publication in 1764 in *Museum Ludovicae Ulricae Reginae* (Stockholm).

In my opinion, the Linnaean specimens in the possession of the Linnaean Society of London and those in the collection of Queen Ludovica Ulrica at Upsala have every claim to be regarded as type specimens, where they correspond to species described in Linnaeus' various works. As far as the Oriental species are concerned, it is significant that, almost without exception, the old authors used the Linnaean names in the sense of the Linnaean specimens and, where they differed, not according to any published figures referred to by Linnaeus.

Cases in which Linnaeus Cited Previously Published Figures in His Original Descriptions in *Systema Naturae, Edition X.*

Before considering the case of *Papilio plexippus*, it may be as well to give examples of analogous cases, and to show what little value can be placed on some of Linnaeus' citations of figures.

Talbot (1943, *Trans. R. ent. Soc. Lond.* **93** : 115) implies that Linnaeus described *P. plexippus* in earlier editions of the *Systema*, but I have found no descriptions of exotic butterflies in any Linnaean publication prior to 1758.

It seems very probable that, prior to 1752, when Osbeck returned to Sweden with butterflies from China, Linnaeus founded some of his descriptions of Oriental species of butterflies on figures in previously published works, and later, when he had actual specimens before him, he altered or amended these descriptions to fit the insects concerned, but rarely troubled to re-examine the figures cited. Some examples will show how this may lead to serious difficulties in nomenclature if citations of figures are allowed to take priority over the actual specimens described in the determination of Linnaean names.

Papilio polytes Linnaeus, 1758.

In the original description of this species (*Syst. Nat., Ed. x* : 460), there is a single reference to a previously published figure which represents *Papilio helenus* and not the butterfly universally known as *P. polytes*. On the other hand, a specimen labelled " *polytes* " by Linnaeus in the Linnaean Collection, and probably obtained by Osbeck in 1751, represents the butterfly known as *P. polytes* ♀-form *polytes* Linnaeus. The same form, probably the same specimen, is figured in Clerck's *Icones*, plate 14, fig. 1. The Queen's Museum at Upsala has two specimens of the same form, and, as Linnaeus gave a reference to " M. L. U." in his original description, one of these Upsala butterflies should be regarded as the name-type.

Papilio memnon Linnaeus, 1758.

In the original description (*Syst. Nat., Ed. x* : 460), the author refers to a previously published figure of *Papilio rumanzovia* Eschscholtz, from Luzon. The original description has a reference to " M. L. U.", and the Queen's Museum has a specimen of *P. memnon* ♂ from Java which accords with the description and should be considered the name-type. The Linnaean Collection has a male of *P. memnon* from China, and this form is figured in Clerck's *Icones*, suppl. pl. 8, fig. 1. That the Linnaean name must be restricted to the Javanese and not to the Chinese form of *P. memnon*, however, is evident from the last sentence of the description in *Edition x*, " Posticae paribus 6 subrotundis, atris."

Papilio hecabe Linnaeus, 1758.

In the original description (*Syst. Nat., Ed. x* : 470), the author refers to a previously published figure in Petiver, *Gazophylacii Naturae et Artis* (London), which depicts the Philippine race of *Eurema hecabe* and not the Chinese subspecies to which the Linnaean name is usually applied. The Linnaean Collection has a female specimen of *E. hecabe*, almost certainly from Canton, and a female of the same form is figured in Clerck's *Icones*, suppl. pl. 6, fig. 4. There is no mention of " M. L. U." in the original description in *Edition x*, and so the Cantonese female is the name-type.

Papilio midamus Linnaeus, 1758.

Of the two references to published figures in the original description of *P. midamus* (*Syst. Nat., Ed. x* : 470), the first, to de Geer, refers to a Chinese

female of the butterfly now known universally as *Euploea midamus*, and the second to two figures by Ehret representing males of *E. midamus* and *E. mulciber* (Cramer) respectively. Linnaeus' description is only applicable to *E. midamus*, however, and the Linnaean Collection has a male of this butterfly, almost certainly the specimen obtained by Osbeck in Canton in 1751, and labelled with the Linnaean name in the author's writing. The two figures designated " *midamus* " in Clerck's *Icones*, suppl. pl. 8, fig. 2, represent males of *E. midamus* and *E. mulciber*. For many years the Linnaean name was applied to Cramer's species, but Moore (1883, *Proc. zool. Soc. Lond.* **1883** : 312) pointed out that Linnaeus' description in the *Tenth Edition* applied to *E. midamus* and not to *E. mulciber*. There is no reference to " M. L. U." in the 1758 description of *P. midamus*, and so the male specimen labelled by Linnaeus in the Linnaean Collection is the name-type.

Papilio similis Linnaeus, 1758.

The specimen in the Linnaean Collection labelled " *similis* " in the author's writing, and the figure in Clerck's *Icones*, pl. 16, fig. 3, both represent the well known *Danaus similis* from Canton. The Petiver figure referred to by Linnaeus in his original description (*Syst. Nat., Ed. x* : 479), however, represents the entirely different species, *D. limniace* (Cramer), from Luzon. There is no reference to a specimen in the Queen's Collection in the original description, and so the Linnaean example is the name-type.

Papilio deiphobus Linnaeus, 1758.

In the original description (*Syst. Nat., Ed. x* : 459), the author cited a Petiver figure which represents the Philippine butterfly *Papilio rumanzovia* Eschscholtz, but this figure cannot be reconciled with the words " Alis caudatis " in the description, and this, doubtless, refers to a specimen of *P. deiphobus* auctt., from Amboina, in the Queen's Collection : possibly it is the same specimen which is figured in Clerck's *Icones*, pl. 25, fig. 1. Incidentally, the Petiver figure cited by Linnaeus (Pet. gaz. t. 11, f. 8) was also referred to in his description of *P. memnon* a few pages earlier in the *Tenth Edition*. The name-type of *deiphobus* must be the specimen in the Queen's Collection.

If the Linnaean names dealt with above are determined according to the procedure outlined in the first section of this paper, that is, on the basis of the type material in the Linnaean Collection and in the collection of Queen Ludovica Ulrica, the names will continue to be employed in the sense in which they are used at present. On the other hand, even if it is agreed that agreement with the original description is essential, the designation of the figures cited by Linnaeus as name-types would have most unfortunate results in the nomenclature of certain common Oriental butterflies. The name *Papilio polytes* would disappear, *Danaus limniace* (Cramer) would henceforth be known as *D. similis* (Linnaeus), and, for the species widely known by the latter name, Cramer's name, *aventina*, would have to be substituted. Were the names to be based on the figures cited by Linnaeus, regardless of any agreement or otherwise with the description, the consequences would be even more disastrous.

THE CASE OF *Papilio plexippus*, LINNAEUS, 1758.

The original description of *Papilio plexippus* in *Syst. Nat., Ed. x* : 471 is as follows :

80. P[apilio] D[anaus] alis integerrimis fulvis : venis nigris dilatatis, margine nigro punctis albis.
Pet. mus. 58. *n.* 527. *Raj. ins.* 138. *n.* 3.
Sloan. jam. 2. *p.* 214. *t.* 239. *f.* 5, 6.
Catesb. car. 2. *t.* 88.
Habitat in America *septentrionali.*
Alae primores fascia alba, ut in sequente [*chrysippus*], *cui similis.*

It will be observed that there is no reference to " M. L. U." in the description, and so it is to be presumed that the specimen described is in the Linnaean Collection, and, indeed, *P. plexippus* is marked in Linnaeus' copy of *Edition x* as being in his own collection.

The first part of the description has no mention of a white fascia on the fore wing, and was, undoubtedly, written for the American " Monarch " butterfly. All four references given by Linnaeus clearly refer to the " Monarch" and not to the Oriental butterfly which, twenty-one years later, Cramer denominated *Papilio genutia*. This accords with the view, already expressed, that when Linnaeus first wrote the description of this and several other species of Oriental butterflies for the *Tenth Edition*, he had no specimens of his own but relied on descriptions and figures in previously published works. There is no evidence that Linnaeus had any North American butterflies in his own collection at the time he was writing the *Tenth Edition*,[1] but it is known that a consignment of Cantonese butterflies received from P. Osbeck in 1752 included specimens of *Danaus plexippus* (i.e. *genutia*), *D. similis* and *Euploea midamus* (Osbeck, 1765, *Reise nach Ostindien und China* . . . , Rostock). It is highly probable that, after the receipt of the Cantonese butterflies, Linnaeus added the final line (" Alae primores fascia alba. . . .") whereby the description of *plexippus* was restricted to the Oriental *genutia* and no longer accorded with the citations referring to the American species.

The Linnaean Collection in London has two undoubted Linnaean specimens of the Oriental *genutia*. One of these is a male set on a short pin with rather large rounded head, exactly of the type use for many of the Lycaenid butterflies in the Linnaean Collection which carry name labels in Linnaeus' handwriting. This specimen has a label, " 80 *Plexippus* ", written by Linnaeus, and a second label, " *Plexippus* 767 ", by Smith : the Linnaean label has two pinholes. A female specimen of *genutia* is without a label, but is low set on a long, black, headless pin, exactly of the type used for most of the Cantonese butterflies which were obtained by Osbeck in 1751.

From a close study of the figure labelled " *plexippus* " in the *Icones*, suppl. pl. 5, fig. 1, I concluded that Clerck had both these Linnaean specimens of *genutia* before him when he painted his figure. Both agree with examples of *genutia* from south-eastern China and, almost certainly, both are Osbeck specimens. I have no hesitation in taking the male specimen bearing the Linnaean name label as the name-type of *P. plexippus* Linnaeus, 1758.

[1] I think it very doubtful if the specimen of *Nymphalis antiopa* (Linnaeus) in the Linnaean Collection, and which Verity (1913, *J. linn. Soc. Lond., Zool.*, 32 : 181) regarded as the name-type, is of American origin, as this author supposed.

A few words are necessary to dispose of four other specimens in the Linnaean Collection. There are two further females of *genutia*, both carrying labels " E. Ind. N.E.K.", and each with a single pinhole. The initials " N. E. K." refer to Nathaniel Edward Kinderley, a cousin of Sir James Edward Smith, who held an appointment on the Madras Establishment of the Hon. East India Company. It is known that he wrote to Smith from Tinnevelley, in the Madras Presidency, about 1784, and it is certain that neither of his specimens of *genutia* were in the Linnaean Collection before it left Sweden. The Linnaean Collection also contains two specimens of the American " Monarch " butterfly, a male labelled " Archippus Fab. 4. 49. Marsham," and a female with a label " Archippus Abbot t. 6. Georgia. W. J. H." : both labels are in Smith's handwriting. The initials " W. J. H." refer to W. J. Hooker, who sent two collectors to North America, and both he and Thomas Marsham were contemporaries of Smith. Again, it is certain that these specimens were added to the collection by Smith. The label on the male " Monarch " butterfly has three pinholes, while that on the female has a single pinhole.

In an attempt to end the unsatisfactory position whereby the name *plexippus* was consistently applied to two quite different species of butterfly, Riley (*in* Poulton and Riley, 1928, *Trans. ent. Soc. Lond.* **1928** : 454) examined the specimens in the Linnaean Collection in London and concluded that the only authentic Linnaean specimens among the examples of the American and Oriental claimants for the name was a male of the American " Monarch." I have shown above that both specimens of the " Monarch " in the collection were added by Smith, and that the collection contains authentic Linnaean examples only of the Oriental *genutia*, one of them bearing a label in Linnaeus' handwriting. It is possible that Riley's investigation accounts for the extra pinholes in the labels of some of the specimens.

Sufficient has been said, I think, to demonstrate that, according to the usual procedure adopted by systematists working in accordance with such guidance as is given by the International Rules of Zoological Nomenclature, the name *Papilio plexippus* Linnaeus, 1758, must be applied to the form of the Oriental *genutia* from south-east China. Nevertheless, it is a matter of interest to consider any specimens of the " Monarch " or *genutia* in the Collection of Queen Ludovica Ulrica, although their identity can have no bearing on the status of the name *plexippus*. *P. plexippus* was re-described by Linnaeus in 1764, *Mus. Lud. Ulr.* : 262, at much greater length than in the 1758 Edition of the *Systema*, and there is the same reference to the white fascia on the fore wing which restricts the name to the Oriental *genutia*. It is stated " Habitat in *America* septentrionali. P. Kalm. meus e China.", which suggests that the Queen had one or more American specimens taken by Kalm, although, at the time Aurivillius examined the collection, there were two examples of *genutia* and none of the " Monarch."

On the other hand, in Linnaeus' original manuscript descriptions apparently written for *Museum Ludovicae Ulricae Reginae*, there is no mention of a white fascia on the fore wing, but there is a reference to a figure of the American butterfly in Catesby, 1731–1743, *Natural History of Carolina, Florida and the Bahama Islands* (London). Aurivillius thought that Linnaeus must have written this description according to a specimen of the " Monarch " in the Queen's Collection, and a little evidence can be adduced in support of such a

view. Apparently other specimens are missing from the Queen's Collection. The North American butterflies *Papilio troilus* and *P. glaucus* were described from " M. L. U." specimens in the *Tenth Edition*; in *Mus. Lud. Ulr.*, they were described as " Habitat in *America* septentrionali. P. Kalm.", and examples of both butterflies still remain in the Queen's Collection at Upsala. It may be argued that it is improbable that Linnaeus based the description of *plexippus* in his manuscript notes entirely on Catesby's figures, for he mentions the antennae, legs and underside of the body, all of which are not visible in this figure. At first sight, all this seems convincing evidence that the Queen had one or more specimens of the " Monarch " butterfly. Nevertheless, a comparison of the description in Linnaeus' notes and that in *Mus. Lud. Ulr.*: 262 suggests that the words in the description following the reference to Catesby's figure and which refer to the antennae, legs, etc., were founded on *genutia* and not on an actual specimen of the " Monarch."

It is a mistake to suppose that the name *plexippus* has long been employed for the American butterfly, and that an attempt is being made to " change the name." Indeed, rather is the reverse the case. After its first appearance in the *Tenth Edition* in 1758 and in *Mus. Lud. Ulr.* in 1764, the Linnaean name was next employed by Osbeck (1765, *op. cit.*: 270) for the Oriental *genutia*, and from an examination of the books written by " reputable authors in systematic and faunistic work " Talbot (1943, *loc. cit.*: 116) concluded that a large majority of those who recorded the Oriental species used the name *plexippus*, while most of those who dealt with the American butterfly did not use this name but *archippus* (Fabricius),[2] although a few used the name *menippe* (Hübner). In fact, according to the International Rules, and the considerations advanced in the first part of this paper, this latter name is the correct one for the North American butterfly.

Summary.

It is shown that, if the name *Papilio plexippus* Linnaeus, 1758, is determined according to the usual procedure adopted by systematic zoologists, and in accordance with the International Rules of Zoological Nomenclature, its use must be restricted to the Oriental *Danaus* species described as *Papilio genutia* Cramer, 1779. The oldest valid name available for the North American " Monarch " butterfly is *Anosia menippe* Hübner, 1816, so that this species should be known as *Danaus menippe* (Hübner).

Nevertheless, a strong case can be put forward in favour of restricting the use of the Linnaean name *plexippus* to the American butterfly. During the past twenty years, this species has been known almost consistently by the Linnaean name, both in Britain and America, and a considerable volume of literature has developed within this period on the subject of the migrations of this butterfly. Accordingly, an application has been made to the International Commission on Zoological Nomenclature for the retention of the name in its current sense, i.e. for the N. American Monarch.[3]

[2] *Papilio archippus* Fabricius, 1793, is preoccupied by *Papilio archippus* Cramer, 1775, a species of *Limenitis*.

[3] This proposal was accepted by the International Commission on Zoological Nomenclature at its Paris meeting, July, 1948.—Ed.

THE LINNAEAN NAMES OF INDO-AUSTRALIAN RHOPALOCERA. PART 7. SUMMARY OF DETERMINATIONS.

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Some eight or nine years ago, I began an investigation into the Linnaean names of the Indo-Australian species of butterflies with a view to ascertaining how far the application of these names was based on the generally accepted principles of zoological nomenclature. This task proved more formidable than I anticipated. After two papers (Parts 1 and 2) dealing with the names had appeared in these *Proceedings* in 1941, I had the inestimable advantage of being able to make a thorough examination of the butterflies in the Linnaean Collection, in the possession of the Linnaean Society of London, while the specimens were being photographed at the Zoological Museum, Tring, in 1941, and I should like to express my warm appreciation to the Linnaean Society of London for the facilities granted. A short account of the Oriental butterflies in the Linnaean Collection was published in Part 3 of this series in 1942. A year or two ago I had the opportunity of studying Osbeck's diary of his voyage to Canton, and the details given left no doubt that the Cantonese butterflies in the Linnaean Collection were those obtained by this traveller in 1751. This matter was discussed in Part 4 of this series in 1945. Since then I have disposed of the difficult cases of *Papilio ajax* (Part 5, appearing in the *Bulletin of Zoological Nomenclature*) and *Papilio plexippus* (Part 6, which precedes this paper in the *Proceedings*), and it only remains to tabulate the essential information regarding the determinations for ready reference by future workers.

In determining the names of the Indo-Australian butterflies described by Linnaeus, the customary procedure has been adopted whereby the identification turns on the type specimen, where this agrees with the published description, and not on any citations of previously published figures. In two exceptional cases, it is known that Linnaeus had to rely entirely on figures, as no specimens were available.

The Linnaean names considered here fall into three classes :

(*a*) Those in which the original description has a reference, " M. L. U.", indicating that it was based on one or more specimens in the Collection of Queen Ludovica Ulrica. This collection remains at Upsala and has been the subject of an extensive monograph by Aurivillius (1882, *Recensio critica Lepidopterorum Musei Ludovicae Ulricae quae descripsit Carolus a Linné*, Stockholm). Where the description has this " M. L. U." reference, the specimens in the Queen's Collection are regarded as typical.

(*b*) Those without a reference to " M. L. U.", and in which the specimens in the Linnaean Collection are regarded as typical.

(*c*) Two cases in which Linnaeus relied on previously published figures for his descriptions.

The specimens in the Linnaean Collection and in the Collection of Queen Ludovica Ulrica are beautifully illustrated, mostly in colour, in C. Clerck, *Icones Insectorum rariorum*, Stockholm. In most cases, the figures have the trivial name written in Linnaeus' handwriting.

Occasionally, Linnaeus was inaccurate and gave a reference to "M. L. U." when the specimen was in his own collection, and he was frequently incorrect in his references to published figures.

The publications of Linnaeus which contain descriptions of butterfly species from the Indo-Australian Region are listed below and referred to by the date of publication in the accompanying Alphabetical List of Species.

1758, Linnaeus, C., *Systema Naturae, Editio x* (Stockholm).
1763, Linnaeus, C. (Proposer, B. Johansson), *Centuria Insectorum rariorum* (Upsala). [Later published in 1763, *Amoenitates Academicae* **6** : 384–415.]
1764, Linnaeus, C., *Museum Ludovicae Ulricae Reginae* (Stockholm).
1767, Linnaeus, C., *Systema Naturae, Editio xii* **1** (Stockholm).
1768, Linnaeus, C. (Proposer, A. Sparrman), *Iter in Chinam* (Upsala). [Later in *Amoenitates Academicae* **7** : 497–506.]
1771, Linnaeus, C., *Mantissa Plantarum, Generum editionis VI et Specierum II* **2** (Vienna).

Localities of the Linnaean Species.

The Indo-Australian species of Rhopalocera described by Linnaeus fall into the following groups when arranged according to locality, collector and publication :

A. Butterflies from Canton obtained, or probably obtained, by Peter Osbeck in 1751. All specimens are in the Linnaean Collection, except *aegisthus*, which is missing, and all are figured in the First and Supplementary volumes of Clerck's *Icones*, except *ajax*, *clytia*, *pyranthe*, *pyrene*, *sarpedon* and *xuthus*

First described in 1758 : *agamemnon*, *agenor*, *aglaja*, *ajax*, *almana*, *assimilis*, *c-aureum*, *chrysippus*, *clytia*, *demoleus*, *dissimilis*, *glaucippe*, *hecabe*, *leda*, *lemonias*, *leucothoë*, *midamus*, *mineus*, *pammon*, *panope*, *paris*, *plexippus*, *pyranthe*, *sarpedon* and *similis*. First described in 1763 : *aegisthus*, *atlites*, *canace* and *hyperbius*. First described in 1764 : *pyrene*. First described in 1767 : *xanthus* (recte *xuthus*).

B. Butterflies from Canton described in 1758 as in "M. L. U." Type specimens are in the Collection of Queen Ludovica Ulrica at Upsala, and possibly obtained by P. Osbeck in Canton in 1751. Specimens of the same species are in the Linnaean Collection, and all are figured in the First and Supplementary volumes of Clerck's *Icones* (except *orithya*) : these specimens were obtained by Osbeck at Canton and, for want of a better term, they have been termed *co-types* in the accompanying Alphabetical List.

First described in 1758 : *aonis*, *asterie*, *helenus*, *hylas*, *orithya*, *perius* and *polytes*.

C. Butterflies from Amboina, collectors unknown. All specimens are in the Collection of Queen Ludovica Ulrica at Upsala, and all are figured in the Second volume of Clerck's *Icones*, except *amphion*, *diomedes* (missing from the Collection), *hedonia* and *thamyras*.

First described in 1758 : *aeropa*, *alimena*, *amphion*, *ceneus*, *deiphobus*, *diomedes* (missing from the Collection), *eurypylus* (missing from the Collection), *lampetia*, *pandarus*, *panthous*, *pipleis*, *polycletus*, *priamus pyrrhus*, *telamon*, *thamyras*, *ulysses*, *urania* and *venilia*. First described in 1763 : *cydippe*, *idea* and *polydorus*. First described in 1764 : *hedonia*.

D. Butterflies from JAVA, collectors unknown. Specimens are in the Collection of Queen Ludovica Ulrica at Upsala, and all are figured in the Second volume of Clerck's *Icones*, except *memnon*.

First described in 1758 : *bolina*, *hyparete* and *memnon*.

E. Butterflies from JAVA collected by Hans Johan Noordgreen. Type specimens are in the Linnaean Collection.

First described in 1763 : *ariadne*, *augias*, *hypermnestra*, *phidippus*, *philomela* and *scylla*.

F. Butterflies from JAVA, collectors unknown. Type specimens are in the Linnaean Collection.

First described in 1764 : *misippus* and *nesaea*. First described in 1767 : *thrax*.

G. Butterflies from CANTON and WEST JAVA, obtained by Anders Sparrman, in 1765–1766, and described in 1768, *Iter in Chinam*. Specimens lost.

Canton : *argyrius* and *canidia*. West Java : *ascanius* and *java*.

H. Butterfly from CEYLON, collector unknown. Specimen is in the Collection of Queen Ludovica Ulrica and is figured in the Second volume of Clerck's *Icones*.

First described in 1758 : *hector*.

I. Butterflies described by Linnaeus from previously published FIGURES.

First described in 1758 : *helena* (Java). First described in 1771 : *eryx* (south-east China).

NOTES ON CERTAIN OF THE SPECIES MENTIONED IN THE ALPHABETICAL LIST.

(a) *Papilio ajax*.—This name has been applied almost consistently, although incorrectly, to the American *Papilio marcellus* Cramer, 1777, and a voluminous literature has developed around this name. The transfer of the name to the species now known as *P. xuthus* Linnaeus is not in the best interests of zoological nomenclature, and an application has been made to the International Commission on Zoological Nomenclature that the name *ajax* should be suppressed (see Part 5 of this series).[1]

(b) *Papilio aonis*.—This name and that of *P. lemonias* appear to be based on identical forms and *aonis* has page priority. In his later works, Linnaeus dropped the former name in favour of the latter, and in this respect he may be considered as a " first reviser."

(c) *Papilio ascanius*.—Although this name has priority over *P. aristolochiae* Fabricius, 1775, it has never been used in this connection, while *P. ascanius*

[1] At the meeting of the International Commission on Zoological Nomenclature held in Paris in July, 1948, Dr. Corbet's proposals in respect of *Papilio ascanius* L. and *Papilio plexippus* L. were accepted, submitted to Congress and approved. No decision was reached in respect of *Papilio ajax* L.—N. D. RILEY.

Alphabetical List of Indo-Australian Species of Papilio *Described by Linnaeus.*

Trivial name.	Reference to the first description.	Habitat given by Linnaeus.	Figure of type or co-type.	Location of type specimen.	True habitat.	Collector.	Modern designation.	Notes.
aegisthus .	1763 : 18	China	Clerck, Supp., pl. 6, fig. 2	Missing from Coll. Linn.	Canton	[P. Osbeck]	Synonym of *Graphium agamemnon agamemnon* (L.)	.
aeropa . .	1758 : 475	Indies	Clerck, 2, pl. 39, f. 1	Mus. Lud. Ulr.	Amboina	Not known	*Euthalia aeropa aeropa* (L.), ♂	.
agamemnon .	1758 : 462	Asia	Clerck, Supp., pl. 10, f. 1	Coll. Linn.	Canton	P. Osbeck	*Graphium agamemnon agamemnon* (L.)	.
agenor . .	1758 : 460	„	Clerck, 1, pl. 15	„	„	„	*Papilio memnon agenor* L., ♀ form *agenor* L.	.
aglaja . .	1758 : 465	„	Clerck, Supp., t. 6, f. 3 (" pasitea ")	„	„	[P. Osbeck]	*Delias aglaja aglaja* (L.), ♀	.
ajax . .	1758 : 462	America boreale	.	„	„	[„]	*Papilio xuthus xuthus* L.	Note (a)
alimena . .	1758 : 478	Indies	Clerck, 2, pl. 32, f. 1	Mus. Lud. Ulr.	Amboina	Not known	*Hypolimnas alimena alimena* (L.), ♂	.
almana . .	1758 : 472	Asia	Clerck, Supp., pl. 4, f. 2	Coll. Linn.	Canton	P. Osbeck	*Precis almana almana* (L.), dry-season form	.
amphion .	1758 : 486	Indies	.	Mus. Lud. Ulr.	Amboina	Not known	*Neptis amphion amphion* (L.)	.
aonis . .	1758 : 473	Asia	Clerck, Supp., pl. 7, f. 2 (" lemonias ") (co-type)	Mus. Lud. Ulr. (Co-type in Coll. Linn.)	Canton	P. Osbeck of co-type	*Precis lemonias lemonias* (L.)	Note (b)
argyrius .	1768 : 10	China	.	Not known	„	A. Sparrman	*Argynnis hyperbius hyperbius* (L.), ♂	.
ariadne . .	1763 : 24	Java	.	Coll. Linn.	Java	H. J. Noordgreen	*Ariadne ariadne ariadne* (L.)	.
ascanius. .	1768 : 7, 8	Insula Nieuw Bay	.	Not known	„	ditto	*Atrophaneura aristolochiae antiphus* (F.)	Note (c)
assimilis .	1758 : 479	Asia	Clerck, 1, pl. 16, f. 1	Coll. Linn.	Canton	[P. Osbeck]	*Hestina assimilis assimilis* (L.)	.
asterie . .	1758 : 472	India	Clerck, Supp., pl. 5, f. 3 (" almana ") (co-type)	Mus. Lud. Ubr. (Co-type in Coll. Linn.)	„	P. Osbeck of co-type	*Precis almana almana* (L.) wet-season form	.
atlites . .	1763 : 24	Asia	Clerck, Supp., pl. 7, f. 5	Coll. Linn.	„	[P. Osbeck]	*Precis atlites atlites* (L.), dry-season form	.
augias . .	1763 : 27	Java, China	.	„	Java	H. J. Noordgreen	*Telicota augias augias* (L.), ♂ (= *bunga* Evans, 1934, *partim*)	.

bolina . .	1758 : 479	Java	Clerck, 2, pl. 21, f. 2	Mus. Lud. Ulr.	„	Not known	*Hypolimnas bolina bolina* (L.), ♂ .
canace . .	1763 : 23	.	Clerck, Supp., pl. 7, f. 4 (" alimenia ")	Coll. Linn.	Canton	[P. Osbeck]	*Polygonia canace canace* (L.) .
canidia .	1768 : 13	Nord Eyland	.	Not known	„	A. Sparrman	*Pieris canidia canidia* (L.) .
c-aureum .	1758 : 477	Asia	Clerck, Supp., pl. 4, f. 3	Coll. Linn.	„	P. Osbeck	*Polygonia c-aureum c-aureum* (L.) .
ceneus . .	1758 : 487	Indies	Clerck, 2, pl. 38, f. 3 (" hyparete ")	Mus. Lud. Ulr.	Amboina	Not known	*Delias ceneus ceneus* (L.), ♀ .
chrysippus .	1758 : 471	Aegyptus, America	Clerck, Supp., pl. 5, f. 2	Coll. Linn.	Canton	P. Osbeck	*Danaus chrysippus chrysippus* (L.), ♂ .
clytia . .	1758 : 479	Indies	.	„	„	„	*Chilasa clytia clytia* (L.) form *clytia* (L.) .
cydippe . .	1763 : 26	India	Clerck, 2, pl. 36, f. 1	Mus. Lud. Ulr.	Amboina	Not known	*Cethosia chrysippe chrysippe* (F.), ♂ Note (d)
deiphobus .	1758 : 459	Asia	Clerck, 2, pl. 25, f. 1	„ „	„	„	*Papilio deiphobus deiphobus* (L.), ♂ .
demoleus .	1758 : 464	„	Clerck, Supp., pl. 6, f. 1	Coll. Linn.	Canton	P. Osbeck	*Papilio demoleus demoleus* L. .
diomedes .	1758 : 462	Indies	.	Missing from Mus. Lud. Ulr.	Amboina	Not known	*Papilio ulysses ulysses* L., ♀ .
dissimilis .	1758 : 479	Asia	Clerck, 1, pl. 16, f. 2	Coll. Linn.	Canton	P. Osbeck	*Chilasa clytia clytia* (L.) form *dissimilis* (L.) .
eryx . .	1771 : 537	China	Daubenton, *Miscellania*, Icones, pl. 71, f. 4, 5	Not known	South-east China	Not known	*Artipe eryx eryx* (L.), ♀ .
eurypylus .	1758 : 464	Indies	Clerck, 2, pl. 28, f. 2	Missing from Mus. Lud. Ulr.	Amboina	„	*Graphium eurypylus eurypylus* (L.) .
glaucippe .	1758 : 469	Asia	Clerck, 2, pl. 35, f. 3 (co-type)	Coll. Linn.	Canton	[P. Osbeck]	*Hebomoia glaucippe glaucippe* (L.), ♂ .
hecabe . .	1758 : 470	„	Clerck, Supp., pl. 6, f. 4	„	„	[„]	*Eurema hecabe hecabe* (L.), ♀ .
hector . .	1758 : 459	Indies	Clerck, 2, pl. 33, f. 1	Mus. Lud. Ulr.	Ceylon	Not known	*Atrophaneura hector* (L.), ♀ .
hedonia . .	1764 : 279	Asia	.	„ „	Amboina	„	*Precis hedonia hedonia* (L.) .
helena . .	1758 : 461	Americas	Merian, *Surinaam. Ins.*, frontispiece	Not known	Java	„	*Troides helena helena* (L.), ♂ .

Alphabetical List of Indo-Australian Species of Papilio *Described by Linnaeus*—(continued).

Trivial name.	Reference to the first description.	Habitat given by Linnaeus.	Figure of type or co-type.	Location of type specimen.	True habitat.	Collector.	Modern designation.	Notes.
helenus . .	1758 : 459	Asia	Clerck, 1, pl. 13, f. 2 (co-type)	Mus. Lud. Ulr. (Co-type in Coll. Linn.)	Canton	P. Osbeck of co-type	*Papilio helenus helenus* L.	.
hylas . .	1758 : 486	Indies	Clerck, Supp., pl. 5, f. 4 (left-hand fig.) (" leucotoe ")	ditto	,,	ditto	*Neptis hylas hylas* (L.)	.
hyparete .	1758 : 469	,,	Clerck, 2, pl. 38, f. 2	Mus. Lud. Ulr.	Java	Not known	*Delias hyparete hyparete* (L.), ♂	.
hyperbius .	1763 : 25	China	Clerck, Supp., pl. 4, f. 1 (" niphe ")	Coll. Linn.	Canton	[P. Osbeck]	*Argynnis hyperbius hyperbius* (L.), ♀	.
hypermnestra .	1763: 24	Java	.	,,	Java	H. J. Noordgreen	*Elymnias hypermnestra hypermnestra* (L.), ♂	.
idea . .	1763 : 22	Indies	Clerck, 2, pl. 38, f. 1	Mus. Lud. Ulr.	Amboina	Not known	*Idea idea idea* (L.), ♂	.
java . .	1768 : 12	Nord Eyland	.	Not known	Java	A. Sparrman	*Anaphaeis java java* (L.)	.
lampetia. .	1758 : 476	Indies	Clerck, 2, pl. 39, f. 2	Mus. Lud. Ulr.	Amboina	Not known	*Cupha lampetia lampetia* (L.)	.
laomedia .	1767 : 772	East India	Clerck, Supp., pl. 7, f. 5	Coll. Linn.	Canton	[P. Osbeck]	Synonym of *Precis atlites atlites* (L.)	Note (e)
leda . .	1758 : 474	Asia	Clerck, Supp., pl. 7, f. 1	,,	,,	P. Osbeck	*Melanitis leda leda* (L.)	.
lemonias .	1758 : 473	Indies	Clerck, Supp., pl. 7, f. 2	,,	,,	,,	*Precis lemonias lemonias* (L.)	.
leucothoë .	1758 : 478	Asia	Clerck, Supp., pl. 5, f. 4 (right-hand fig.)	,,	,,	,,	Synonym of *Parathyma perius perius* (L.)	Note (f)
memnon .	1758 : 460	,,	.	Mus. Lud. Ulr.	Java	Not known	*Papilio memnon memnon* (L.), ♂	.
midamus .	1758 : 470	,,	Clerck, Supp., pl. 8, f. 2 (upper fig.)	Coll. Linn.	Canton	P. Osbeck	*Euploea midamus midamus* (L.), ♂	.
mineus . .	1758 : 471	China	Clerck, Supp., pl. 7, f. 3	,,	,,	,,	*Mycalesis mineus mineus* (L.), wet-season form	.
misippus .	1764 : 264	America	.	,,	Java	Not known	*Hypolimnas misippus misippus* (L.), ♀	.
nesaea . .	1764 : 302	Asia	.	,,	,,	,,	*Elymnias nesaea nesaea* (L.), ♂	.

niphe	1767 : 785	China	Clerck, Supp., pl. 4, f. 1	,,	Canton	[P. Osbeck]	Synonym of *Argynnis hyperbius hyperbius* (L.)	Note (g)
orithya	1758 : 473	Indies	.	Mus. Lud. Ulr. (Co-type in Coll. Linn.)	,,	P. Osbeck of co-type	*Precis orithya orithya* (L.)	.
pammon	1758 : 460	Asia	Clerck, 1, pl. 14, f. 2	Coll. Linn.	,,	P. Osbeck	*Papilio polytes polytes* (L.), ♂	.
pandarus	1758 : 461	India	Clerck, 2, pl. 26, f. 2 (" pipleis ")	Mus. Lud. Ulr.	Amboina	Not known	*Hypolimnas pandarus pandarus* (L.), ♀	.
panope	1758 : 479	Asia	Clerck, Supp., pl. 10, f. 3	Coll. Linn.	Canton	[P. Osbeck]	*Chilasa clytia clytia* (L.) form *panope* (L.)	.
panthous	1758 : 461	Indies	Clerck, 2, pl. 19	Mus. Lud. Ulr.	Amboina	Not known	*Troides priamus priamus* (L.), ♀	.
paris	1758 : 459	Asia	Clerck, 1, pl. 13, f. 1	Coll. Linn.	Canton	P. Osbeck	*Papilio paris paris* (L.)	.
pasithoe	1767 : 755	,,	Clerck, Supp., pl. 6, f. 3	,,	,,	[P. Osbeck]	Synonym of *Delias aglaja aglaja* (L.)	Note (h)
perius	1758 : 471	Indies	Clerck, Supp., pl. 5, f. 4 (right-hand fig.) (" leucotoe ") (co-type)	Mus. Lud. Ulr. (Co-type in Coll. Linn.)	,,	P. Osbeck of co-type	*Parathyma perius perius* (L.)	.
phidippus	1763 : 19	Java	.	Coll. Linn.	Java	H. J. Noordgreen	*Amathusia phidippus phidippus* (L.), ♂	.
philomela	1763 : 21	,,	.	,,	,,	ditto	*Ypthima philomela philomela* (L.), ♂	.
pipleis	1758 : 476	Indies	Clerck, 2, pl. 26, f. 2	Mus. Lud. Ulr.	Amboina	Not known	*Hypolimnas pandarus pandarus* (L.), ♀	.
plexippus	1758 : 471	North America	Clerck, Supp., pl. 5, f. 1	Coll. Linn.	Canton	P. Osbeck	*Danaus plexippus plexippus* (L.), ♂ (= *genutia* (Cramer, 1779))	Note (i)
polycletus	1758 : 485	Indies	Clerck, 2, pl. 17, f. 2	Mus. Lud. Ulr.	Amboina	Not known	*Hypochrysops polycletus* (L.), ♀	.
polydorus	1763 : 18	India	Clerck, 2, pl. 33, f. 2	,, ,,	,,	,,	*Atrophaneura polydorus polydorus* (L.)	.
polytes	1758 : 460	Asia	Clerck, 1, pl. 14, f. 1 (co-type)	Mus. Lud. Ulr. (Co-type in Coll. Linn.)	Canton	[P. Osbeck] of co-type	*Papilio polytes polytes* (L.) ♀ form *polytes* (L.)	.
priamus	1758 : 458	Amboina	Clerck, 2, pl. 17, f. 1	Mus. Lud. Ulr.	Amboina	Not known	*Troides priamus priamus* (L.), ♂	.

Alphabetical List of Indo-Australian Species of Papilio *Described by Linnaeus*—(continued).

Trivial name.	Reference to the first description.	Habitat given by Linnaeus.	Figure of type or co-type.	Location of type specimen.	True habitat.	Collector.	Modern designation.	Notes.
pyranthe	1758 : 469	Asia		Coll. Linn.	Canton	[P. Osbeck]	*Catopsilia pyranthe pyranthe* (L.), ♂	
pyrene	1764 : 241	China		,,	,,	[,,]	*Ixias pyrene pyrene* (L.), ♂	
pyrrhus	1758 : 462	Indies	Clerck, 2, pl. 25, f. 2	Mus. Lud. Ulr.	Amboina	Not known	*Polyura pyrrhus pyrrhus* (L.), ♂	
sarpedon	1758 : 461	Asia		Coll. Linn.	Canton	[P. Osbeck]	*Graphium sarpedon sarpedon* (L.)	
scylla	1763 : 20	Java		,,	Java	H. J. Noordgreen	*Catopsilia scylla scylla* (L.), ♂	
similis	1758 : 479	Asia	Clerck, 1, pl. 16, f. 3	,,	Canton	P. Osbeck	*Danaus similis similis* (L.)	
telamon	1758 : 486	Indies	Clerck, 2, pl. 40, f. 4 (" hylas ")	Mus. Lud. Ulr.	Amboina	Not known	*Cyrestis telamon telamon* (L.)	
thamyras	1758 : 483	Tropics	Aurivillius, *Recensio*, pl. 1, f. 5	,, ,,	,,	,,	*Arhopala thamyras thamyras* (L.), ♂	
thrax	1767 : 794	Java		Coll. Linn.	Java	,,	*Erionota thrax thrax* (L.), ♂	
ulysses	1758 : 462	Asia	Clerck, 2, pl. 23, f. 1	Mus. Lud. Ulr.	Amboina	,,	*Papilio ulysses ulysses* (L.), ♂	
urania	1758 : 466	Indies	Clerck, 2, pl. 29, f. 3 (" cassiae ")	,, ,,	,,	,,	*Tenaris urania urania* (L.), ♀	
venilia	1758 : 478	Tropics	Clerck, 2, pl. 32, f. 4	,, ,,	,,	,,	*Neptis venilia venilia* (L.)	
xanthus (recte *xuthus* in index)	1767 : 751	East India		Coll. Linn.	Canton	[P. Osbeck]	*Papilio xuthus xuthus* (L.)	Note (j)
xuthus (see *xanthus* above)								

- All the types and co-types of the above names present in the Linnaean Collection at Burlington House have name labels written by Linnaeus, except *almana*, *ariadne*, *clytia*, *glaucippe*, *hypermnestra*, *leucothoë*, *misippus*, *nesaea*, *perius* and *phidippus*. The type specimen of *aglaja* is labelled " pasithoe," that of *atlites* " laomedia," that of *hyperbius* " niphe," that of *philomela* " lara " and that of *xuthus* " ajax " ; the co-types in the Linnaean Collection of *aonis* and *hylas* are labelled " lemonias " and " leucothoë " respectively. The significance of this rather haphazard labelling by Linnaeus is discussed in Part 3.

Cramer, 1775, is employed for a closely allied American Papilionid. As strict adherence to the law of priority in this case could only cause confusion and inconvenience, an application has been made to the International Commission on Zoological Nomenclature for the suppression of Linnaeus' name.[1]

(d) *Papilio cydippe.*—This name is preoccupied by *Papilio cydippe* Linnaeus, 1761, which refers to a European species of *Argynnis*. The next oldest name for the *Cethosia* species is *Papilio chrysippe* Fabricius, 1775.

(e) *Papilio laomedia.*—Linnaeus proposed this name as an alternative one for *P. atlites*, but for what reason is not known.

(f) *Papilio leucothoë.*—Linnaeus was never clear about the two Nymphalid species widely known as *Neptis hylas* and *Parathyma perius*, and treated them as three distinct species.

(g) *Papilio niphe.*—Linnaeus proposed this name as an alternative for the *Argynnis* species he had described as *P. hyperbius*, doubtless because he had also employed this latter name for a Satyrid species in 1764.

(h) *Papilio pasithoe.*—Linnaeus proposed this name as an alternative for the *Delias* species he had described as *P. aglaja*, doubtless because he had also employed this latter name (on a later page in *Editio x*), for the well-known European species of *Argynnis*. In this connection, see Hemming, 1942, *Proc. R. ent. Soc. Lond.* (B) **11** : 155.

(i) *Papilio plexippus.*—Although there can be no doubt that this name should be applied to the Oriental *Danaus* species also described as *Papilio genutia* Cramer, 1779, there is much to be said in favour of continuing to employ the name for the American "Monarch" butterfly, around which a considerable literature has developed during the past twenty years on account of its migratory habits. Accordingly, an application has been made to the International Commission on Zoological Nomenclature asking for the name to be reserved for the American "Monarch" butterfly, and taking as the name-type the figure referred to by Linnaeus in Catesby, 1731–1743, *Natural History of Carolina, Florida and the Bahama Islands* (London).[1]

(j) *Papilio xanthus.*—Under this name, Linnaeus redescribed the species described as *P. ajax* in 1758. He altered the name *xanthus* to *xuthus* doubtless because he had already employed this former name for a South American Brassolid species described in 1764.

Book Notices.

Britain in Pictures : British Butterflies. By Vere Temple. 4to. London (Collins), 1949. Pp. 48, 8 pl. (col.), text illust. Price 5s.

As in others of this series, the text is to some degree subordinate to the illustrations. Several coloured plates and black and white illustrations are taken from Moufet, Benjamin Wilkes, Moses Harris and Donovan, others being original figures by the author.

The text deals briefly with such topics as : origins of British butterflies, distribution, life-cycle, butterfly courtship, egg-laying, migration and hibernation, butterfly vision. The work concludes with "some original observations."

[1] See footnote on page 193.

The Dragonflies of the British Isles. By CYNTHIA LONGFIELD. 2nd edition. 8vo. London (Warne & Co., Ltd.), 1949. Pp. 258, 58 pls. (col.), text illust. Price 17s. 6d.

The first edition of this work, which forms one of the well-known *Wayside and Woodland* Series, appeared in 1937, and this new and enlarged edition is the result of the great demand for information on this order of insects.

The book begins with a glossary, followed by a list of Latin and Greek names showing their modern pronunciation.

There is a separate chapter on each species, giving a full description, chief characters, notes on habits, time of appearance, and distribution records arranged in counties and vice-counties.

These records, gathered from a wide range of sources, have been brought up to the end of 1947, and include a new discovery, *Coenagrion scitulum* (Rambur), made in 1946.

The emphasis throughout is placed on how to identify a British Dragonfly, and a special feature of the work is a life-size photograph of each species and many drawings and enlargements of special parts.

Included in the work also are chapters on the life-history, methods of collecting, preserving and breeding these insects.

A chapter on classification, a check-list, and an index complete the book.

Larvae of Insects: An Introduction to Nearctic Species. Part I: *Lepidoptera and Plant-infesting Hymenoptera.* By ALVAH PETERSON. 4to. Columbus, Ohio (the author), 1948. (Lithoprinted.) Pp. 315, 14 + 58 + 12 pls. Price $5.00.

This work is partly based upon, and expanded from, keys to immature stages of insects prepared for classes at the Ohio State University, and the form of the work is that of a teaching manual. There are introductory sections on equipment, killing, preserving and inflating larvae. Table I gives a census of insect species inhabiting the United States and the world.

A series of keys to Orders of immature stages of Nearctic insects are illustrated by the first series of 14 plates, each comprising six or more figures. There is a general bibliography.

The section on larvae of Lepidoptera has a general account of anatomy, including a description and table of larval chaetotaxy. There are three keys, one to families, one to Pyralidae injurious to stored food products, and one to Pyralidae injurious to corn, sugar-cane and related plants. A List of Families tabulates the usage of four authorities, followed by the description of the larvae of "most families of Lepidoptera"; a table of "some common, important and unusual species," with scientific and common names; and finally 58 plates and a bibliography.

The section on Hymenoptera follows a similar plan, but on a smaller scale, with 12 plates.

The work ends with a glossary of terms, chiefly morphological, host-indexes for Lepidoptera and Hymenoptera, and a general index.

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Smith, A., 1936, New Species of COCCIDAE. *Proc. R. ent. Soc. Lond.* (B) **6** : 301-306, pl. 1.

——, 1936, New species of COCCIDAE. *Trans. R. ent. Soc. Lond.* **84** : 901-936.

Titles of periodicals cited are to be abbreviated in the manner indicated in the *World List of Scientific Periodicals, 2nd edition*, 1934.

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TO BE HELD IN THE SOCIETY'S ROOMS

41, Queen's Gate, S.W. 7

1949

Wednesday, November 2
„ December 7

1950

Wednesday, January 18 (Annual Meeting)
„ February 1
„ March 1

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